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Archeological Monitoring at Dingmans Launch Lower Boat Ramp

Delaware Water Gap National Recreation Area

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ARCHEOLOGICAL MONITORING AT DINGMANS LAUNCH LOWER BOAT RAMP DELAWARE WATER GAP NATIONAL RECREATION AREA PIKE COUNTY, PENNSYLVANIA

By

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ABSTRACT

Archeological monitoring was undertaken at Dingmans Ferry, Delaware Water Gap National Recreation Area, in association with pavement removal and surface grading at the Dingmans Launch Lower Boat Ramp. This development area was within the boundaries of a prehistoric site, 36Pi136. Previous investigations at 36Pi136 revealed multiple components ranging in age from the Late Archaic through the Late Woodland. Several prehistoric hearth features, including a rock platform 4.5 feet in diameter which dated to the Transitional/Early Woodland, were previously excavated. During the regrading of the Lower Boat Ramp area, eight prehistoric features were noted. These included hearths, shallow or truncated pits, FCR concentrations, and clusters of lithic tools and debitage that may represent former activity areas. Lithic tools included bifaces, a polished celt, a banded slate atlatl weight, a netsinker, and several food processing implements. Two diagnostic projectile points were identified: a Transitional period Susquehanna Broadspear and an Middle Woodland Fox Creek. Prehistoric ceramic artifacts included vessel fragments, a single pipe fragment, and two bead fragments. The two features that were associated with ceramic wares, all Late Woodland types, produced radiocarbon dates of circa 1200. A third radiocarbon date, which came from a rock feature without associated diagnostic artifacts, was 3230 ± 60 B.P., suggesting a Transitional period affiliation. In addition to six carbonized beans recovered during excavation, flotation samples produced botanical remains that included other cultigens (maize and sunflower), wild seeds (poke, elderberry, blackberry/raspberry), nutshell, and wood and grass fragments. Faunal remains from flotation samples, which were not identifiable to species, included both medium and small mammal bone, a single fish vertebra, possible turtle and bird bones, and one bivalve. Remains of daub suggest that there may have been a structure in the vicinity of the various features identified in the boat ramp area.

ACKNOWLEDGMENTS

Many individuals contributed to the investigations at Dingmans Launch. Dr. Michael L. Alterman served as LBA's Principal Investigator. There were several episodes of monitoring and the archeologists who conducted this work included Bradford Botwick, Richard Vernay, and Timothy Sara. Beverly Boyko, Ronald Kearns, and Brad Koldehoff contributed to the analysis of the lithic assemblage; Beverly Boyko analyzed the prehistoric ceramics; Marie-Lorraine Pipes identified the faunal remains; and Kathryn Parker identified and interpreted the paleobotanical remains.

Paul Y. Inashima, the Co-Principal Investigator for the project, served as the Contracting Officer's Representative for the National Park Service. Mr. Inashima provided invaluable guidance and support throughout these investigations.

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I. INTRODUCTION

Archeological monitoring was undertaken at Dingmans Ferry Boat Launch (hereafter Dingmans Launch), in the Delaware Water Gap National Recreation Area, during reconstruction of the Lower Boat Ramp. The boat ramp, built in 1990, had to be replaced because it was at too steep a grade. The archeological monitoring was performed by the Cultural Resource Group of Louis Berger & Associates, Inc. (LBA), under an indefinite quantities contract with the National Park Service, Denver Service Center (NPS-DSC). Field monitoring occurred intermittently between September 3 and October 6, 1992. Construction impacts included the removal of pavement and regrading in the vicinity of the boat ramps.

The boat ramp area is located at the northeast end of a known prehistoric site, 36Pi136, first recorded in 1984 during initial archeological testing by The American University prior to the development of the Dingmans Launch area (Fischler 1990). The site was further investigated in 1989 and 1990 by archeologists from LBA (Alterman 1991). Work in 1989 included testing in the area of a proposed leach field and coring in the comfort station location. Investigations in 1990 consisted of monitoring during the excavation for the comfort station, during installation of utilities and drainage systems, and during construction of two boat ramps and parking lots. Emergency data recovery was necessary during this monitoring program to adequately salvage prehistoric deposits and features exposed by construction impacts.

Previous investigations at 36Pi136 provided evidence of prehistoric occupation spanning the Late Archaic through Late Woodland periods. Diagnostic artifacts included various Late Archaic and Transitional point types (Normanskill, Perkiomen, Bare Island/Lackawaxen) and Early, Middle, and Late Woodland ceramics. Several hearth features were identified by clusters of fire-cracked rock (FCR), charcoal, and burned soil. Four radiocarbon dates derived from the site ranged from circa 2000 B.C. to 400 B.C. The most dramatic find was a platform hearth measuring 4.5 feet in diameter that was uncovered in the area of the comfort station. Over 200 kg of FCR and a large quantity of wood charcoal were recovered from this feature; however, no artifacts, other than FCR, were present. The hearth was radiocarbon-dated circa 2400 B.P., which suggested an Early Woodland affiliation (Alterman 1991). The flotation samples from this feature, referred to as Comfort Station Feature 1, were processed as part of the current boat ramp monitoring project and the results are presented in this report.

Monitoring of the Lower Boat Ramp reconstruction project located eight prehistoric features. These included clusters of FCR, artifact concentrations, hearth basins, and shallow or truncated pits. Diagnostic lithic artifacts recovered during the boat ramp monitoring included Susquehanna Broadspear (Transitional) and Fox Creek (Early Woodland) points, an Early Woodland banded slate atlatl weight, and a polished celt, a netsinker, and a pestle that probably date to the Late Woodland. Prehistoric ceramic vessels, part of a ceramic pipe, and two bead fragments are also dated to the Late Woodland. Flotation samples provided information on diet and the types of vegetation, particularly wood species, that were exploited.

II. PROJECT SETTING AND ENVIRONMENT

The Delaware Water Gap National Recreation Area was created in 1965 to preserve scenic, scientific, and historic resources of the Upper Delaware River valley, and develop recreational activities for public use. The park contains approximately 70,000 acres along the Delaware valley in northwestern New Jersey and northeastern Pennsylvania. Park lands extend some 35 miles along the river from a point 3.5 miles south of Port Jervis, New York, to a point 1.5 miles south of the water gap near East Stroudsburg, Pennsylvania. Dingmans Launch is located about 8 miles south of Milford, Pennsylvania, and about 22 miles north of the gap (Figure 1).

The park is located within two physiographic provinces, the Ridge and Valley and the Appalachian Plateau, and is within Braun's (1950) Oak-Chestnut Forest Region. The local forest regime is more accurately classified as a white pine-hemlock-hardwood community that before human intervention would most likely have been a sugar maple-mixed hardwood forest (Robichaud and Buell 1973:262). Bedrock in the Upper Delaware valley consists of shale, sandstone, siltstone, and limestone of the Devonian Mahantango Formation (Socolow 1980). The area was covered by numerous glacial advances during the Pleistocene. Present landforms include glacial kame terraces, drumlins, and kettle holes that were created during glacial retreat, 15,000-12,000 years ago. Above Bushkill, Pennsylvania, in the area of Dingmans Launch, a mantle of Holocene colluvial deposits partially covers glacial deposits on the valley floor.

Dingmans Launch is situated on gently sloping alluvial terraces of the Delaware at the downstream end of a river bend that begins about one-half mile north of the project area at the mouth of Dingmans Creek (Figure 2). The lower terrace, which is about 10 feet above the river, covers a small area at the north end of Dingmans Launch. The upper terrace, which is approximately 20 feet above the river, reaches a width of 1,000-1,200 feet. These terraces were formed by episodic overbank deposition over the past 12,000 years. Three swales, which represent old channels or flood chutes, cut across this terrace. The boat ramps at Dingmans Launch extend from the upper terrace, which has a maximum elevation of about 377 feet amsl, to the river's edge, which is typically at an elevation of around 357 feet amsl.

The Soil Conservation Service classifies the soils within the project area as Tioga Silt Loam and Tioga Loamy Fine Sand (Taylor 1969). Tioga soils are described as deep, well-drained soils occurring on nearly level floodplains and high bottomlands. They have developed under forest vegetation in loamy waterlain sediments washed from mixed gray and red materials of the glacial uplands. They are acid and contain few stone fragments.

The alluvial deposits that comprise the upper terrace are over 11 feet thick, and the great depth of these deposits has created some difficulties for the development of archeological survey and testing strategies. In particular, without large exposures, it is nearly impossible to locate Early Holocene remains and the small or isolated features that elude typical interval testing (see Chapter IV).

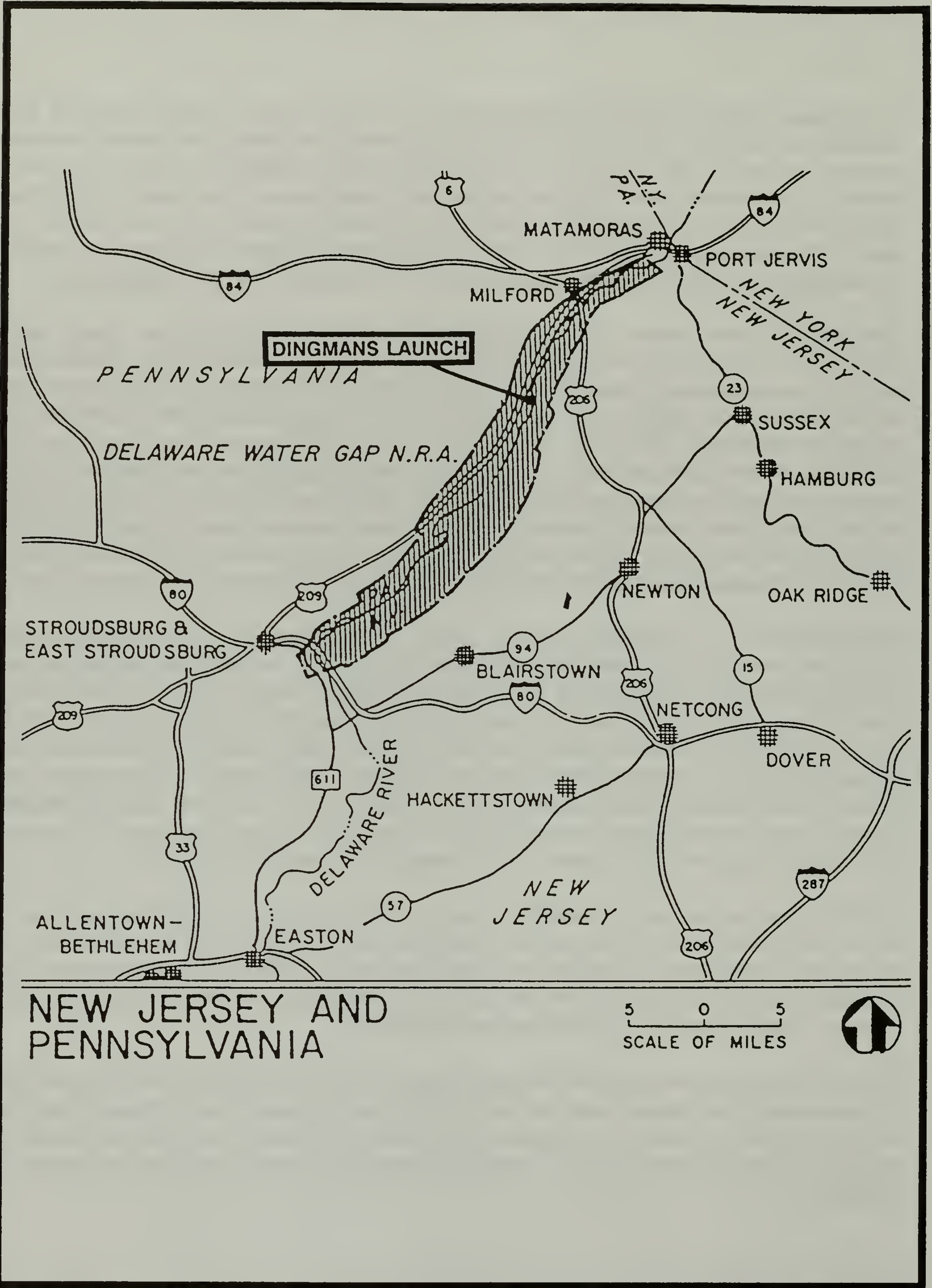

FIGURE 1 Vicinity Map

SOURCE National Park Service

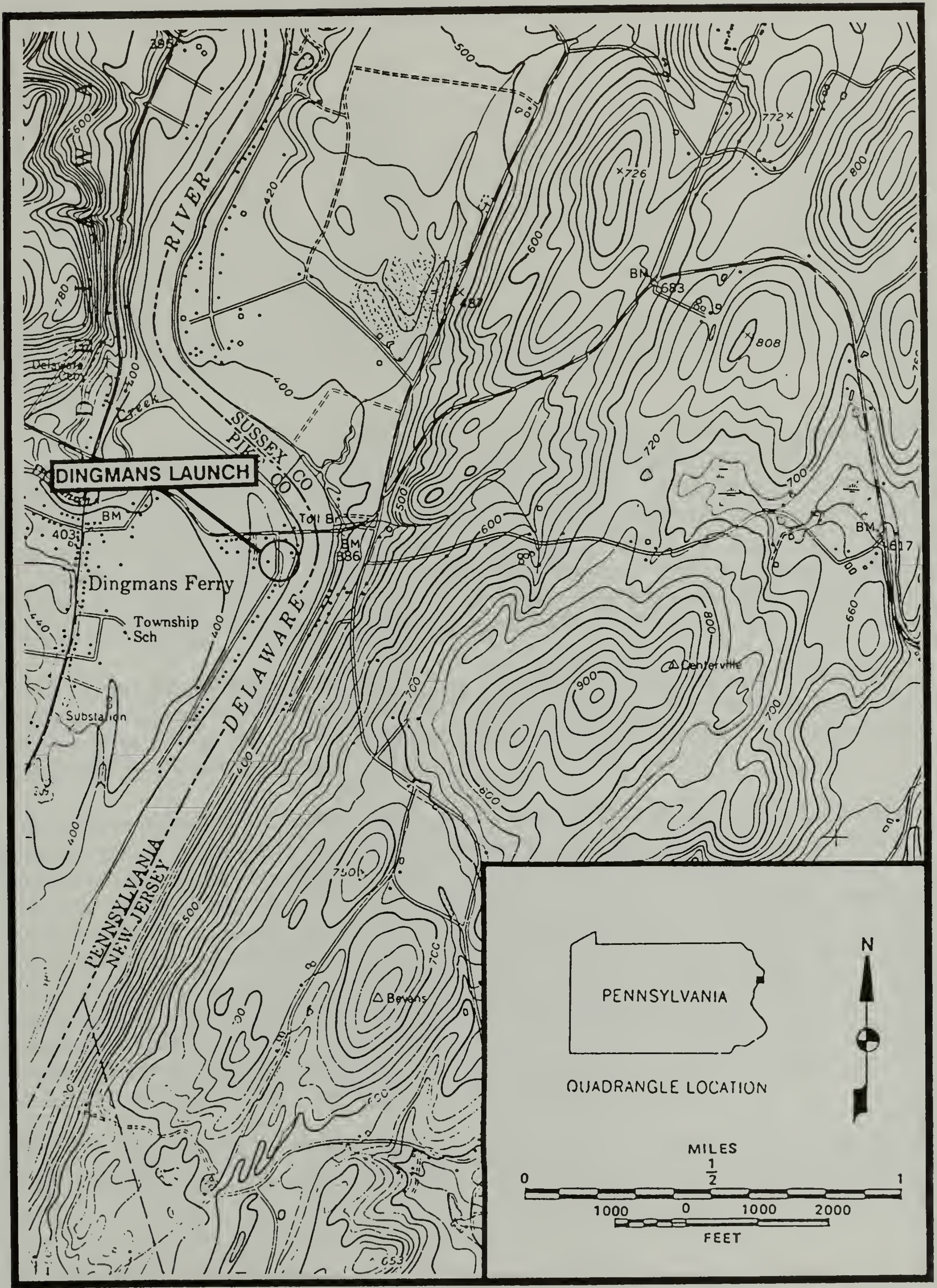

FIGURE 2 Project Location

SOURCE USGS 7.5 Minute Series, Culvers Gap Quadrangle, New Jersey-Pennsylvania 1954 (Photorevised 1971)

III. PREHISTORIC OVERVIEW

The earliest documented aboriginal occupation of the Upper Delaware River valley is associated with the Paleoindians (ca. 9000-8000 B.C.), who are recognized as the first pan-continental populations in North America. Paleoindian sites are distinguished by distinctive fluted points, most of which have been surface finds (Kinsey 1972a:327; Marshall 1982). Characterized as relatively mobile hunter-gatherers, Paleoindian populations were presumably small and probably moved seasonally within extensive but prescribed territories. The occurrence of sources of high-quality, cryptocrystalline rock for tool manufacture was one of several variables that appear to have influenced Paleoindian settlement patterns (cf. Gardner 1977). Although some revisited habitation sites are known which may have been occupied by large groups (Kraft 1973; McNett 1985), most known Paleoindian localities seem to represent the short-term, single-event activities or encampments of small groups.

The cooler and moister climate of the time, influenced by continental glaciation, supported plant and animal communities unlike those of today. Pine-dominated forests alternated with open sections that supported herds of more cold-adapted ungulates and some now-extinct megafauna. The Paleoindian stone toolkit emphasized hunting and hunting-related activities. Floral and faunal evidence from the Shawnee-Minisink Site in the Upper Delaware valley, however, shows that fishing and gathering were also important subsistence activities (McNett 1985). Nevertheless, the absence of specialized tools for processing plant resources stresses the significance of hunting in Paleoindian subsistence pursuits.

The subsequent Archaic period is defined by changes in subsistence and technology that occurred in response to environmental amelioration. The transition from Paleoindian to Archaic lifeways included a greater reliance on small game and plant foods (Cleland 1976) and these changes were accompanied by new technologies and tool types.

There is little evidence of occupation during the Early and Middle Archaic periods in the Upper Delaware valley. During this time, the climate became warmer and there was an increase in vegetational diversity that affected animal communities. It is possible that the mixed deciduous forests that were emerging during the Early and Middle Archaic had a relatively low carrying capacity that would have influenced the size of the aboriginal population. What little is known of the Early Archaic populations in the project vicinity, circa 8000-6000 B.C., suggests that they followed the hunting and gathering traditions of their predecessors. Early Archaic toolkits are characterized by various notched projectile point types, including Palmer and Kirk, and bifurcate-base types, such as LeCroy (Broyles 1971; Coe 1964). Cryptocrystalline lithic materials continued to be favored, although a wider variety of other materials appear to have been employed during the Early Archaic than during Paleoindian times.

The limited data available on Middle Archaic occupation of the Northeast, circa 6000-4000 B.C., suggest the continued development of a diffuse adaptive strategy, although seasonal movements may have been more regularized than during the Early Archaic (Snow 1980). The number of Middle Archaic sites known for the region suggests a continual growth in population. Hunting and gathering still characterize the Archaic lifeways, although the appearance of grooved axes, milling equipment, and netsinkers in some areas indicates an increase in the diversity of exploited resources and perhaps more specialized subsistence activities. The climate was warm and wet at this time and forests are thought to have expanded dramatically. Deer would have been the dominant large mammal in the area. Data from the Middle Atlantic and Northeast regions suggest a de-emphasis in the importance of lithic sources for influencing settlement locations and movements relative to Paleoindian and Early Archaic times. A variety of lithic materials were employed in tool production, with a growing emphasis on materials such as quartzite and vein quartz that had previously experienced limited use.

Evidence of Late Archaic settlement in the Upper Delaware valley, circa 4000-1000 B.C., indicates a substantial increase in population and group size, as well as qualitative changes in subsistence patterns. Site locations and artifact assemblages reflect an increased utilization of riverine resources, possibly in response to environmental stabilization. Groundstone food processing tools, such as nutting or anvil stones and manos and metates, become more common beginning in the Late Archaic, and this reflects a more intensive utilization of plant resources. Points commonly associated with Late Archaic sites include narrow-bladed types, such as Lamoka, Lackawaxen, Bare Island, Poplar Island, and Normanskill, and broader, notched points, such as Vosburg and Brewerton. Some investigators have argued that these different point forms or traditions represent distinct populations with different adaptive patterns, i.e., groups that lived in overlapping territories while exploiting different ecological zones (Dincauze 1975; Kinsey 1977; Ritchie 1980).

The Terminal Archaic or Transitional period is characterized by the introduction of soapstone/steatite bowls and distinctive broadspear points, including Susquehanna, Koens-Crispin, and Perkiomen types, and chronologically later fishtail points, such as the Orient type (Ritchie 1980; Witthoft 1953). Radiocarbon dates from Transitional sites range from circa 1700 to 700 B.C. (Kinsey 1972a:349-360). Large concentrations of FCR, sometimes referred to as "rock platforms" have been associated with some Transitional period sites in the Upper Delaware valley (Kinsey 1972a:358; Kraft 1970).

The Woodland period is traditionally distinguished from the Archaic by the use of ceramics. The earliest ceramic types found in the Northeast and Middle Atlantic regions are Marcey Creek steatite-tempered (Evans 1955) and sand- and grit-tempered wares referred to as Vinette 1 and Ware Plain (Cross 1941; Ritchie and MacNeish 1949). Fishtail points, which are common in the Upper Delaware beginning circa 1200 B.C., are sometimes associated with the same ceramic types that are found with Early Woodland Meadowood points, dated circa 750 B.C. This continuum between Archaic and Woodland traditions in the Upper Delaware valley makes it difficult to draw a sharp distinction between the Late Archaic and Early Woodland settlement patterns of the region. The intensive exploitation of valley settings that began during the Late Archaic and Transitional periods continued during the Early Woodland. Although there is a marked riverine focus to settlements of this period, use of upland settings for resource procurement also occurs.

Cordmarked, net-marked, and fabric-impressed ceramic wares become common during the Middle Woodland period, circa 400 B.C. to A.D. 900. Middle Woodland cultures show a basic continuity of lifestyles with their Late Archaic and Early Woodland predecessors, with somewhat of a constriction in the size of exploitative territories. In the absence of significant environmental and technological changes, the limiting of territorial boundaries is viewed as a result of growing populations and elaborations of social relationships and organization.

During Late Woodland times (A.D. 900-1620), farming-related base camps or villages are added to the inventory of known sites. Although hunting and gathering remain important subsistence pursuits, the cultivation of domesticated plants such as corn (*Zea mays*), beans, and squash is significant. The size of exploitative territories of groups seems to decline from its Middle Woodland level, and the appearance of fortifications at some sites indicates inter-group conflicts. Excavations at the Miller Field Site in Warren County, New Jersey, revealed a site plan that included longhouse patterns, various pit features (including storage pits), and burials (Kraft 1970, 1972). Artifacts diagnostic of the Late Woodland period include ceramic vessels with collared rims, many with incised decoration, and small triangular Madison points.

Previous testing at Dingmans Launch identified two prehistoric sites, 36Pi136 and 36Pi137, both located on the second alluvial terrace above the Delaware River at elevations ranging from 370 to 380 feet amsl (Fischler 1990). The boat launch area is within the boundaries of 36Pi136, as defined through previous archeological monitoring (Alterman 1991). Prehistoric components identified at 36Pi136 span the Late Archaic through Late Woodland periods. Diagnostic artifacts recovered from this site included various Late Archaic and Transitional point types (Normanskill, Perkiomen, Bare Island/Lackawaxen) and Early, Middle, and Late Woodland ceramics. Several hearth features have been identified by clusters of FCR, charcoal, and burned soil, and four charcoal samples provided radiocarbon dates that range from circa 2000 B.C. to 400 B.C. (Alterman 1991). The previous investigations at 36Pi136 are described in more detail in the following chapter.

There are four other recorded prehistoric sites located immediately across the Delaware River in New Jersey. The only one of these sites to be intensively investigated, the Friedman II Site, produced mixed Late Archaic components, including Lackawaxen, Vosburg, Beekman Triangle, Normanskill, Brewerton, Perkiomen, and Orient types (Kinsey 1972a:334-335; Marchiando 1967). On the Pennsylvania side of the river, about two miles north of Dingmans Launch, is the Zimmermann Site (36Pi14). Excavations at the Zimmermann Site produced artifacts and features that span about 3,300 years of prehistoric occupation, from the Late Archaic through late prehistoric and early historic times. Features included pits, postmolds, concentrations of FCR, and burials. Two large storage pits contained a quantity of charred corn resting on a coarse grass lining (Werner 1972).

IV. PREVIOUS SITE INVESTIGATIONS

The Dingmans Launch area was initially surveyed in 1984 by The American University under a Cooperative Studies arrangement with the National Park Service's DSC Eastern Applied Archeology Center. The six-acre development area was divided into four parts, designated Areas A through D. Testing consisted of 162 shovel tests, 8 auger tests, 2 excavation units, and backhoe trenches (Fischler 1990:1-46). The boat ramp area, located between Areas A and B, was not tested at this time. Two prehistoric sites—36Pi136 and 36Pi137—were identified during the 1984 survey; both were located on the second alluvial terrace above the Delaware River at elevations ranging from 370 to 380 feet above mean sea level. Site 36Pi136 was discovered in Area B and extended for at least 400 feet parallel to and at distances up to 200 feet west of the river. The other site, 36Pi137, was located farther west of the river, in Survey Areas C and D, and consisted of an area measuring approximately 150 by 50 feet.

A Woodland component was defined at 36Pi136 on the basis of four ceramic sherds of unspecified type found approximately 1.5 feet below surface (374 feet amsl). An earlier component was defined by a shallow rock-filled pit located in a backhoe trench at an elevation of 372-373 feet amsl. Charcoal from this feature was dated by radiocarbon assay at 2740 ± 140 B.P. (Beta-15577), providing a tentative association with the Transitional period, Orient phase (Fischler 1990:22). The fill from this feature was processed by flotation methods, but no paleobotanical remains, i.e., seeds or nutshell, were recovered (French 1988).

Only a few tools were found during initial testing at 36Pi136 and none of these were temporally diagnostic (Fischler 1990:30). Debitage constituted 90 percent of the lithic artifacts, with chert the predominant material, followed by jasper, quartzite, argillite, siltstone, and sandstone. Fischler (1990:28) described the spatial distribution of artifacts found at the site as "patchy." The size of 36Pi136 was estimated as over one acre, although neither the northern nor the southern limits of the site were confirmed.

A total of 266 prehistoric artifacts were recovered from 36Pi137 from depths of 0.8 to 3.0 feet below ground surface (378.5-376.7 feet amsl). The only chronologically diagnostic artifact was a Late Archaic Lackawaxen Straight Stemmed point made of argillite. No prehistoric ceramics were recovered from 36Pi137. Over 90 percent of the debitage recovered from the site was black to gray chert, with the remainder consisting of argillite, jasper, quartzite, and siltstone. One concentration of FCR was found at a depth of 1.5 feet below surface (Fischler 1990:38, 40).

The vertical and horizontal extent of 36Pi136 was refined during several episodes of archeological testing and construction monitoring. In 1989, LBA tested an area where a leach field was proposed and placed an auger test in the comfort station location. This project located only small quantities of debitage and FCR in the area of the leach field location at depths of 1.0 to 2.6 feet below ground surface (376.0-373.4 feet amsl).

In 1990, LBA performed intermittent archeological monitoring during the construction of the comfort station, parking lots, and boat ramps and the installation of utilities and drainage systems (Alterman 1991) (Figure 3). A soil profile recorded during tree removal in the boat ramp area revealed two buried A-horizons (10YR 3/3 dark brown sandy loam with charcoal flecks) at 365.8-366.2 feet and 364.2-364.5 feet amsl, respectively. Seven fragments of FCR, with a total weight of 687 g, and a single black chert flake were found in the deeper organic stratum. The only other prehistoric artifact recovered in the boat ramp area was a single fragment of FCR (127 g) found in the cutbank during grading.

Monitoring of other construction areas provided important data on the horizontal extent, stratigraphy, and component definition of 36Pi136, particularly the deeper deposits that appear to have eluded earlier testing. In the area of the comfort station, numerous artifacts and several possible hearth features were identified in the north, east, and south profiles of a 40x80-foot construction pit that was excavated to a depth of 8 feet. The locations of artifacts were marked and collected after the profiles were drawn and photographed. The majority of artifacts seen in profile were contained in two horizons, one at approximately 372-373 feet amsl, and the other at 370-371.5 feet amsl. Several pieces of FCR were located at depths of almost 368 feet amsl. One sample from an FCR concentration in the east profile of the comfort station pit, designated Feature 1, produced a date of 2710 ± 90 B.P. Another charcoal sample from the south profile at an elevation of 372 feet amsl produced a date of 3890 ± 110 B.P. (Alterman 1991).

Emergency data recovery was conducted to mitigate any further impact to the potentially significant archeological deposits exposed in the comfort station pit. Construction was discontinued and four units were excavated adjacent to the cutbank to expose Feature 1, which, when fully exposed, was found to be a rock platform hearth about 4.5 feet in diameter. A total of 616 stones and stone fragments with a total weight of 212.7 kg were found within this feature, which was surrounded by fire-reddened soil. The FCR was concentrated between 370.2 and 370.7 feet amsl and was situated above a charcoal lens. A sample of this charcoal produced a radiocarbon date of 2450 ± 60 B.P., which is several centuries later than the radiocarbon date derived from charcoal collected from the east wall profile. Artifacts found above and in the general vicinity of the feature included chert and jasper flakes, pottery, bone fragments, a straight-stemmed point, a fragment of a grinding stone, and a fragment of soapstone.

Two other hearth features at 36Pi136 were found during construction monitoring, one in the main parking lot immediately west of the boat ramps, and the other in a trench excavated for the installation of a storm sewer. These locations were approximately 15 feet north and west, respectively, of the comfort station hearth, Feature 1. The parking lot hearth (Feature 3) was at an elevation of 368.3-369.1 feet amsl, and consisted of FCR, burned soil, and charcoal. No artifacts were located in association with Feature 3; however, a charcoal sample was radiocarbon-dated 2370 ± 80 B.P., which is roughly comparable to the date obtained for Feature 1. The hearth identified in the storm sewer trench (Feature 2) was situated at the base of a buried A-horizon at an approximate elevation of 367 feet amsl. Feature 2 consisted of a shallow pit, about 2.5 feet in diameter, filled with FCR and burned earth, but the charcoal was insufficient to sample for a reliable date (Alterman 1991:30).

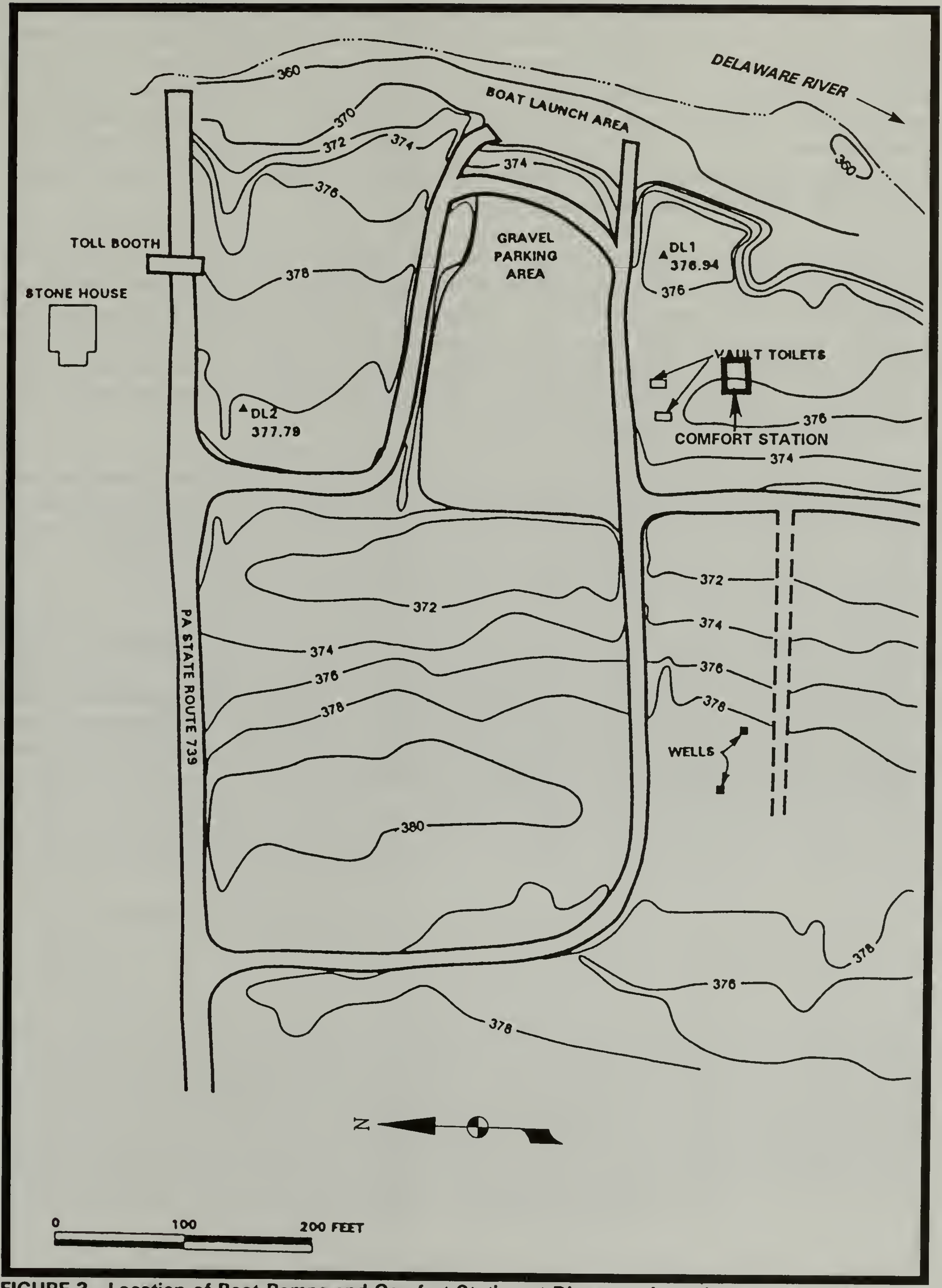

FIGURE 3 Location of Boat Ramps and Comfort Station at Dingmans Launch Relative to the Pre-1990 Construction Site Plan

Another area that was intensively investigated during construction at Dingmans Launch was a portion of the French drain alignment, about 500 feet south of the comfort station area. Shovel testing on the crest of the alluvial terrace recovered 1 chert Normanskill projectile point, 1 argillite core, 28 flakes, 2 sherds of coarse grit-tempered pottery of unidentified type, and 16 pieces of FCR. Based on these results, three adjacent units with a total dimension of 3x10 feet were excavated. Artifacts recovered included an argillite Perkiomen broadspear point, a jasper Normanskill point reworked into an endscraper, biface fragments, a hammerstone, flakes of various lithic materials, and over 6 kg of FCR.

The various testing projects at Dingmans Launch exemplify the problems of surveying in the Upper Delaware floodplain, where the depth of deposits that have the potential to contain archeological remains may exceed 10 feet. Testing in the area of Site 36Pi136 during the 1984 survey consisted of 86 shovel tests that achieved depths of only 0.9 to 1.3 feet, a single excavation unit that was 4 feet deep, and two backhoe trenches that reached depths of 6 feet below surface. A feature exposed in one of the backhoe trenches was the only indication of the Late Archaic/Transitional occupation at this location.

With the exception of the comfort station excavation, most of the construction impacts that were monitored in 1990 were narrow in scope, such as the installation of utility lines, or relatively shallow, such as grading for the parking lots, boat ramps, and landscaping. Nevertheless, buried features were located during an unauthorized construction pit excavation in the parking lot area, in the storm sewer trench, and, potentially, in the electrical line trench.

In summary, prior testing, monitoring, and data recovery at 36Pi136 identified prehistoric remains extending over an area at least 800 feet north-south by about 300 feet east-west. Diagnostic artifacts recovered from the site provide evidence of Late Archaic, Transitional, and Early through Late Woodland occupations. Buried features, which included hearths and a rock platform, ranged in depth between 367 and 373 feet amsl and provided charcoal samples with radiocarbon dates ranging from circa 2000 B.C. to 400 B.C.

V. ARCHEOLOGICAL MONITORING AT THE LOWER BOAT RAMP

A. METHODS

Eight prehistoric features were identified during monitoring of machine grading between the upper and lower (north and south) boat ramps at Dingmans Launch (Plate 1). These were designated Features 1 through 4 and Features 6 through 9; there is no Feature 5. The features were mapped in relation to two construction datums—Radius Points C-1 and C-2—within the parking lot, and absolute elevations were calculated from NPS benchmark DL-1 (Figure 4).

Features were drawn in plan view and bisected in order to record profiles. In some instances, the precise locations of artifacts within features were mapped; because of the potential for artifact displacement during the grading, these spatial relationships remain questionable and are discussed in detail. A portion of fill from each feature was collected for flotation and the remainder was screened through 1/4-inch mesh. In the case of Feature 3, one-half of the fill was retained for flotation and the remainder was screened through 1/8-inch mesh. Charcoal samples were recovered from Features 1, 2, and 4, and these were submitted to Beta Analytic, Inc., for radiocarbon dating.

Two 5x5-foot units were excavated within a large artifact concentration, designated Feature 9 (see Figure 4). The units were excavated in arbitrary 0.3-foot levels. A one-gallon sample was taken from each level for flotation and the remaining soil was screened through 1/4-inch mesh.

Table 1 summarizes the characteristics of the eight features from the boat ramp area. The feature descriptions in the following section include summaries of artifact contents, with an emphasis on the screened samples. In some cases, results from the flotation samples are included in the feature descriptions. A complete summary of the faunal and floral remains recovered from the flotation samples is presented in Chapter VI, and a detailed report of the paleobotanical remains is included as Appendix 1. A report of botanical remains from Comfort Station Feature 1 is provided in Appendix 2.

B. DESCRIPTION OF FEATURES

1. Feature 1

Feature 1 was situated at an elevation of 370.8 feet amsl. Located 68 feet east of Radius Point C-1 and 90 feet northeast of NPS benchmark DL-1 (see Figure 4), Feature 1 consisted of a shallow circular pit measuring 3.2 feet in diameter, with a maximum depth of 0.4 foot (Figure 5). This feature was identified during monitoring by the presence of several sherds and lithic artifacts in association with a soil stain that contrasted with the surrounding yellowish brown (10YR 5/4) sandy loam. The soil matrix of this feature was a dark brown (7.5YR 3/4) sandy loam with yellowish red (5YR 4/6) mottles and charcoal flecks (Plate 2).

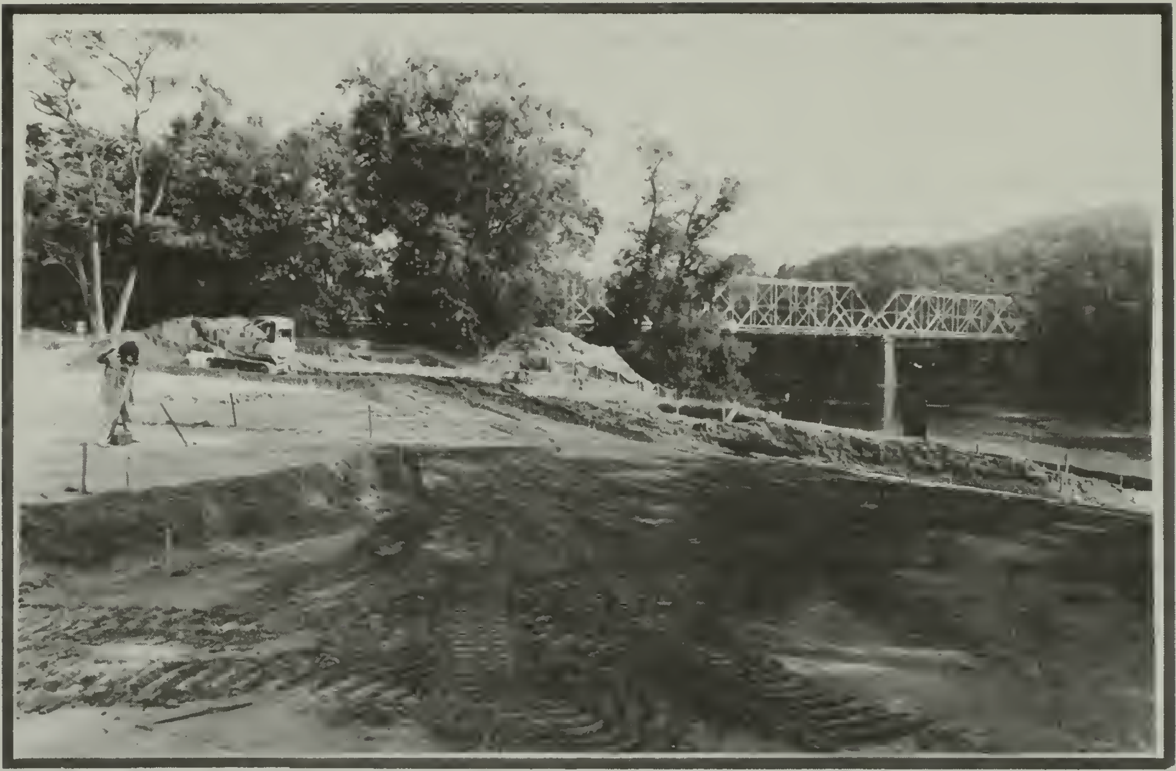

PLATE 1: View of Delaware River and Dingmans Ferry Bridge from Graded Boat Ramp Area

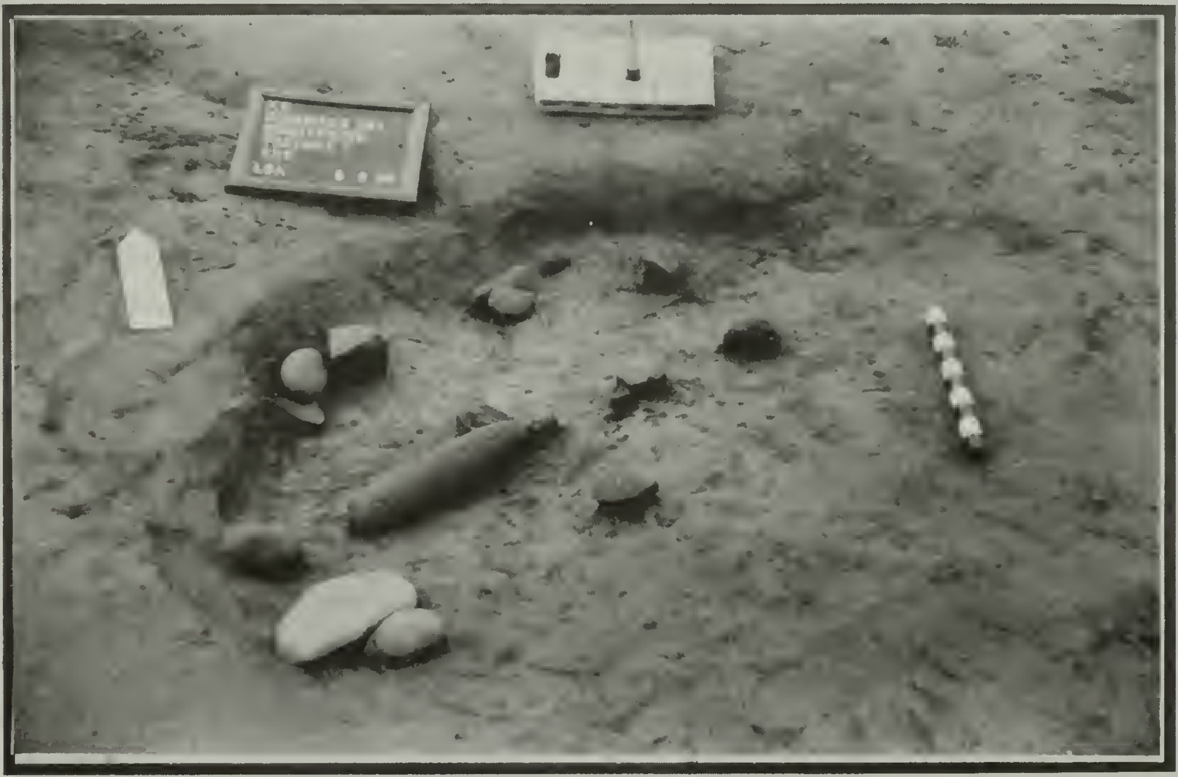

PLATE 2: Feature 1 After Excavation, View to North

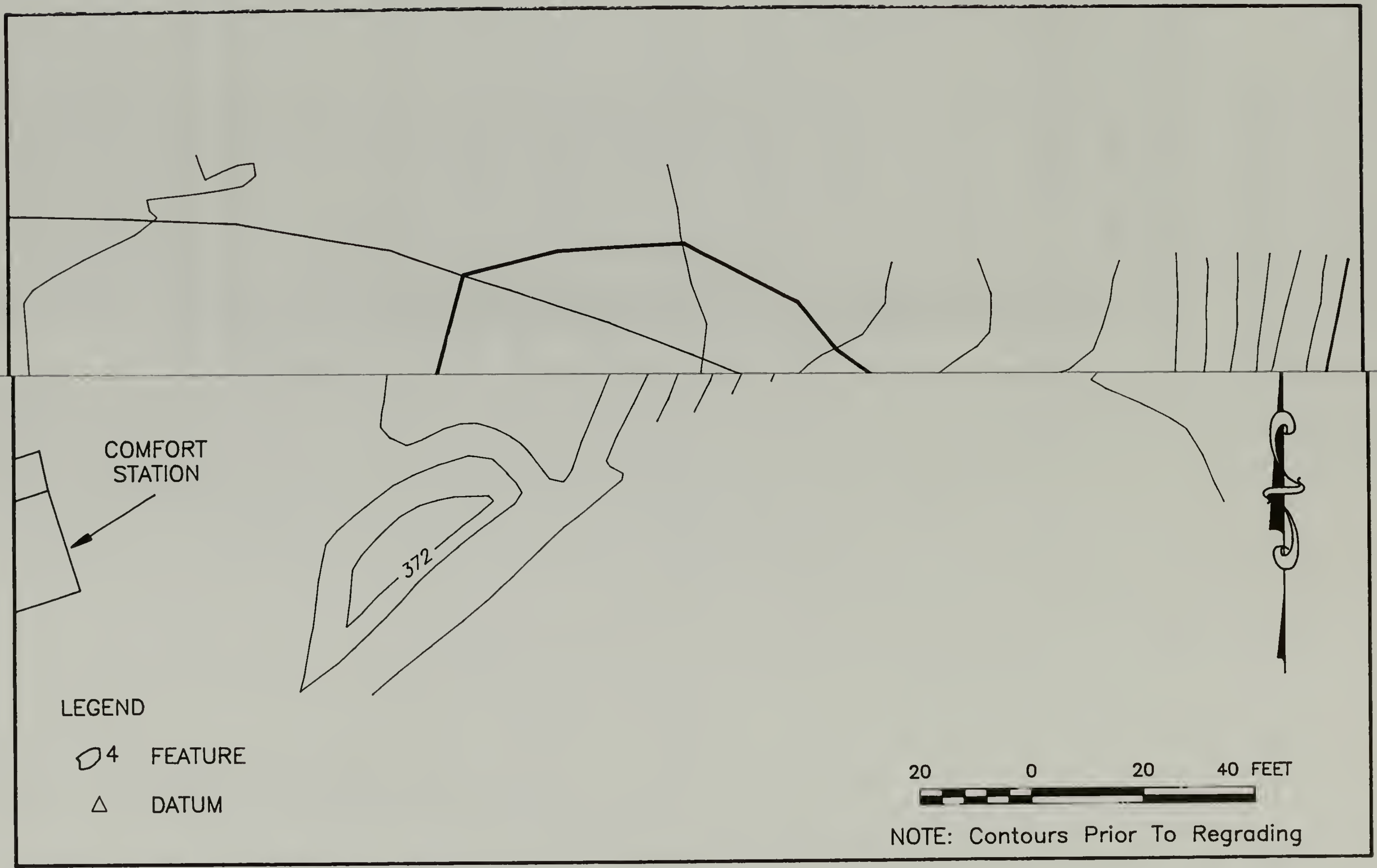

FIGURE 4 Location of Features and Excavation Units

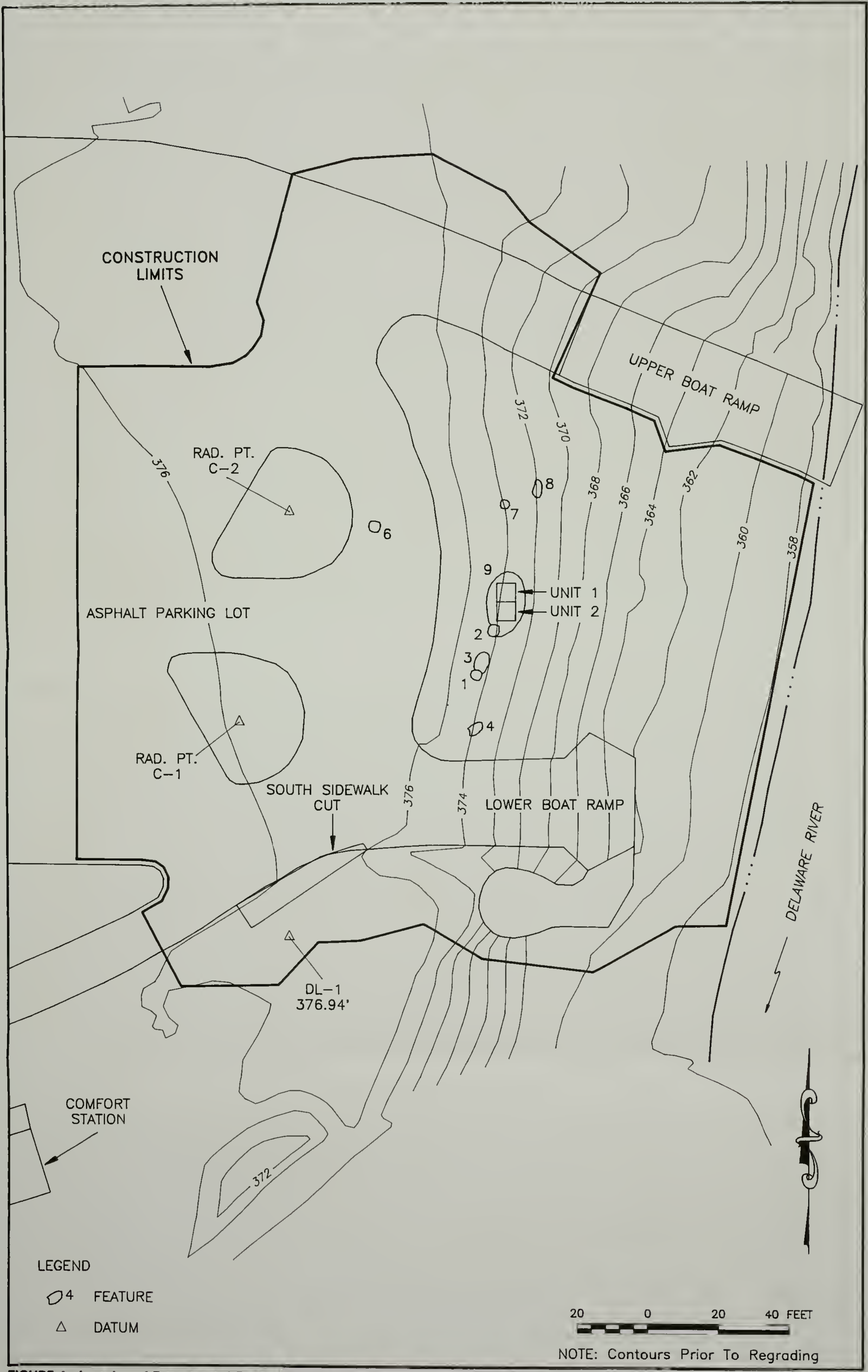

FIGURE 4 Location of Features and Excavation Units

TABLE 1

FEATURE SUMMARY
DINGMANS LAUNCH LOWER BOAT RAMP MONITORING

FEATURE	ELEVATION (feet amsl)	DESCRIPTION	DIAGNOSTIC ARTIFACTS & C14 DATES
4	370.8	round, shallow hearth pit; 3.2-foot diameter	Late Woodland pottery; cultigens; 740 ± 80 B.P.
2	373.7	circular, shallow pit; possible hearth or truncated storage pit; 3-foot diameter	Late Woodland pottery; cultigens; 780 ± 110 B.P.
3	370.8	ovoid area of reddened soil; activity area	Early Woodland atlatl weight
4	369.0	rectangular concentration of FCR; 4x3 feet; possible platform hearth	3230 ± 60 B.P.
6	373.7	shallow basin containing quantity of FCR; 2-foot diameter	No diagnostics
7	370.8	small cluster of FCR; 1-foot across	No diagnostics
8	372.1	FCR and tools generally dispersed in a 7x4-foot area; activity locus	Middle Woodland Fox Creek point
9	371.2 - 369.3	large artifact concentration in an 18x9-foot area; deposits extend over 2 feet in depth, probably representing superimposed activity loci	Susquehanna Broadspear; soapstone vessel fragments; Transitional period

NOTE: No feature was assigned the number 5

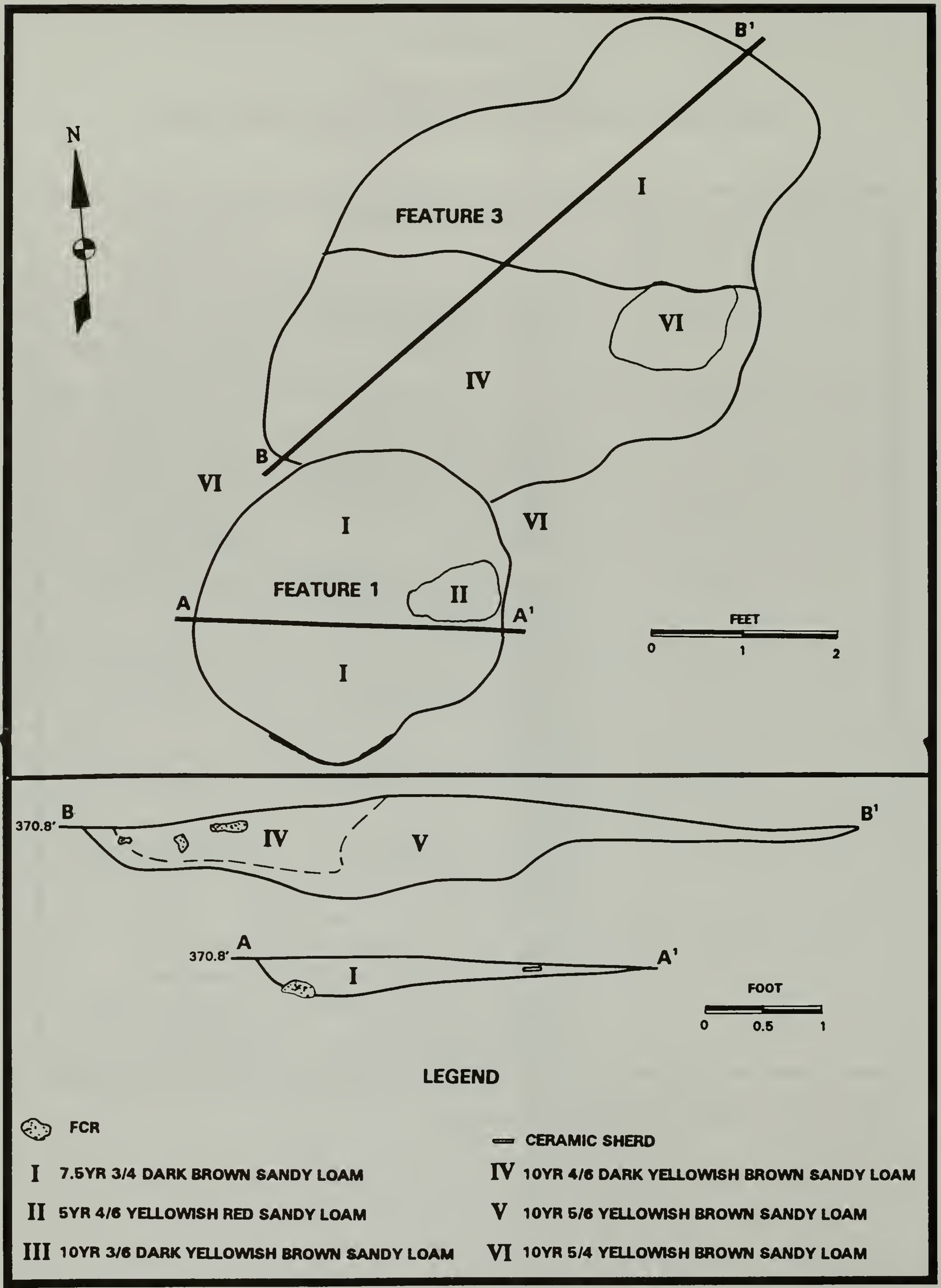
N
B'
I
FEATURE 3
VI
IV
B
VI
I
VI
FEATURE 1
II
A
A'
I
FEET
0
1
2
370.8'
B
IV
V
B'
370.8'
A
I
A'
FOOT
0
0.5
1
LEGEND
FCR
CERAMIC SHERD
I 7.5YR 3/4 DARK BROWN SANDY LOAM
II 5YR 4/6 YELLOWISH RED SANDY LOAM
III 10YR 3/6 DARK YELLOWISH BROWN SANDY LOAM
IV 10YR 4/6 DARK YELLOWISH BROWN SANDY LOAM
V 10YR 5/6 YELLOWISH BROWN SANDY LOAM
VI 10YR 5/4 YELLOWISH BROWN SANDY LOAM

FIGURE 5 Features 1 and 3, Plan View and Profiles

A quantity of prehistoric ceramics, daub, stone tools, debitage, FCR, and charcoal was recovered from Feature 1. The 25 pieces of FCR from Feature 1 weighed almost 8 kg. Of the 39 ceramic sherds from the screened sample, 37 were sand-tempered and may represent a single vessel. The sand-tempered body sherds had burnished surfaces and two of them, from the shoulder area of the vessel(s), were decorated with shallow incised diagonal lines. The remaining two sherds from Feature 1 had grit temper; one of them was the castellation from a collared vessel, which would date to the Late Woodland. Flotation samples contained 61 mostly tiny fragments of ceramic of variable temper. Other fired clay artifacts from Feature 1 included 4 fragments from a ceramic pipestem, 6 pieces of daub, and 1 pieces of burned clay with possible incising or a vegetal impression. Lithic artifacts included cobble and groundstone tools, but a relatively low frequency of lithic debitage. Two large utilized flakes, classified as teshoas, were recovered. Both of these were made from local metasedimentary rock. The other tools associated with the feature included a chopper/anvil, a metate with minor anvil use, a pestle or pestle preform, a netsinker, and a celt. The celt was mended from four fragments that displayed evidence of fire-cracking. Of the 6 flakes recovered from the screened sample, 2 were metasedimentary decortication flakes, 3 were early reduction flakes (2 metasedimentary, 1 quartzite), and 1 was a piece of chert block shatter. In addition, 2 jasper bipolar cores, 15 pieces of debitage (5 chert, 10 jasper), and small fragments of FCR were recovered from the flotation samples.

Seven carbonized beans and a deer mandible were recovered from Feature 1. The deer mandible was not calcined and is considered a modern intrusion. Dietary remains from the flotation samples included 198 calcined animal bone fragments, nutshell, maize, beans, and various seeds (see Chapter VI and Appendix 1). The presence of cultigens confirms the affiliation of Feature 1 with the Late Woodland. A radiocarbon date of 740 ± 80 B.P. (Beta-57128) was derived from charcoal located at the base of Feature 1. Although the small size of this sample, 0.4 g of carbon, necessitated extended counting time, the date is consistent with a Late Woodland affiliation.

2. Feature 2

Feature 2 was situated 75 feet northeast of Radius Point C-1, 103 feet northeast of benchmark DL-1 (see Figure 4). The elevation of the feature, 370.7 feet amsl, is comparable to that of Feature 1. In plan view, Feature 2 was almost circular and had a diameter of 3.0 feet. Cross-sectioning of the feature revealed a shallow profile with a maximum depth of 0.3 foot (Figure 6). The feature fill was a dark brown (7.5YR 3/3-3/4) sandy loam flecked with charcoal that intruded into the 10YR 5/4 yellowish brown sandy loam B-horizon. Artifacts recovered from Feature 2 included a teshoa, two early reduction flakes, and prehistoric pottery. In contrast with the ceramics recovered from Feature 1, which were almost all sand-tempered, the six identifiable sherds from Feature 2 had coarse grit temper. Incised decoration on some sherds, including multiple parallel and perpendicular lines, indicates a Late Woodland date for Feature 2.

Two ceramic bead fragments, one with incised decoration, were recovered from the flotation samples from this feature along with 38 small ceramic fragments, 1 jasper bipolar core, 1 jasper

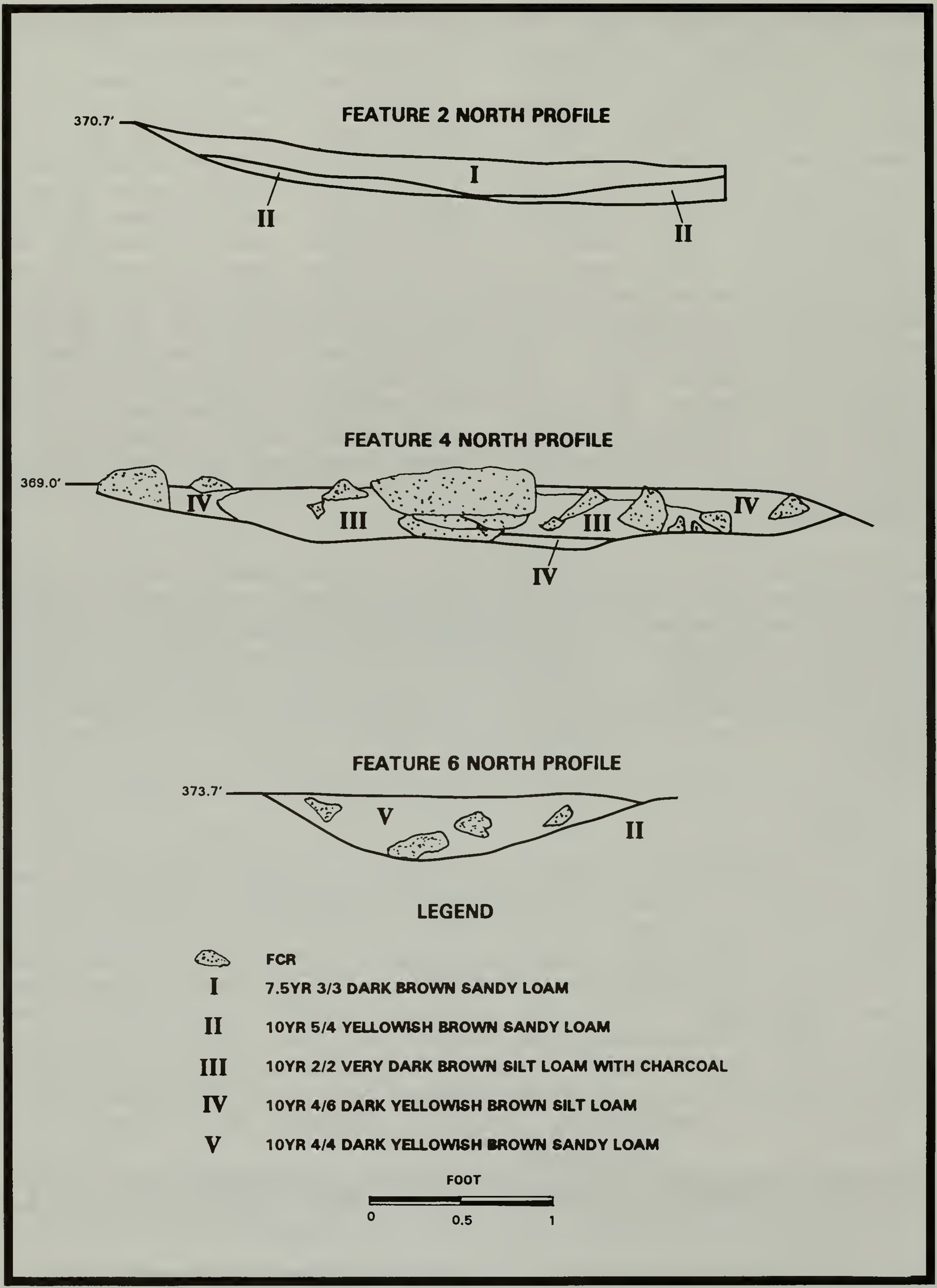
FEATURE 2 NORTH PROFILE
370.7'
I
II
II
FEATURE 4 NORTH PROFILE
369.0'
IV
III
III
IV
IV
FEATURE 6 NORTH PROFILE
373.7'
V
II
LEGEND
FCR
I 7.5YR 3/3 DARK BROWN SANDY LOAM
II 10YR 5/4 YELLOWISH BROWN SANDY LOAM
III 10YR 2/2 VERY DARK BROWN SILT LOAM WITH CHARCOAL
IV 10YR 4/6 DARK YELLOWISH BROWN SILT LOAM
V 10YR 4/4 DARK YELLOWISH BROWN SANDY LOAM
FOOT
0
0.5
1

FIGURE 6 Profiles of Features 2, 4, and 6

biface fragment, 21 pieces of debitage, and small pieces of FCR. Flotation samples also yielded 515 calcined bone fragments representing mammal, fish, and possibly turtle and bird, and some paleobotanical materials that included nutshell, a sunflower seed, and kernels of maize. A charcoal sample from Feature 2 provided a radiocarbon date of 780 ± 110 B.P. (Beta-57129). Again, the small size of this sample, 0.3 g of carbon, necessitated extended counting time. This date is comparable with the date derived from Feature 1 and would be consistent with the Late Woodland affiliation indicated by the ceramic assemblage and the identification of maize.

3. Feature 3

Feature 3 was contiguous to and northeast of Feature 1 and was situated at the same elevation of 370.8 feet amsl (see Figure 5). The feature consisted of a 6.7x4.8-foot oval stain that contained several large cobbles, FCR, and a number of stone tools (Figure 7). The feature fill was a dark yellowish brown to yellowish brown (10YR 3/6-5/6) sandy loam that contained calcined bone fragments and charcoal flecks. Feature 3 was bisected along its long axis and the southern half was removed and screened through 1/8-inch mesh. The cross section revealed an irregular depression no deeper than 0.7 foot (see Figure 5). Most of the northern half of the feature was excavated as a flotation sample.

Artifacts recovered from the combined screened and flotation samples included a midsection of a chert point of unidentified type, a portion of a banded slate atlatl weight, a hammerstone/mano, an anvil stone, a biface fragment, 36 pieces of debitage, and approximately 160 pieces of FCR with a total weight of 27 kg. Although a large sample of soil was processed by flotation methods, this feature yielded relatively few faunal remains: a total of 14 calcined bone fragments and a single small clam shell. The paleobotanical remains from the flotation sample included a large quantity of nutshell, 3,678 fragments weighing 62.1 g. The absence of cultivated plant remains in the botanical sample suggests a date for this feature prior to the Middle or Late Woodland. The atlatl weight suggests an Early Woodland Adena/Meadowood affiliation for Feature 3.

4. Feature 4

Feature 4 was situated 65 feet east of Radius Point C-1, 77 feet northeast of DL-1, and at an elevation of 369.0 feet amsl (see Figure 4). The feature consisted of a rectangular concentration of FCR measuring 4.0x3.0 feet. The FCR was contained in a soil matrix of very dark brown (10YR 2/2) silt loam which differed from the surrounding yellowish brown (10YR 5/4) sandy loam.

The cross section of Feature 4 suggested that the shallow pit had been excavated prior to the placement of stone, which consisted of a central large flat stone, supported by three smaller flat stones, and surrounded by densely packed FCR. Ninety-six pieces of FCR with a total weight of 97.6 kg were recovered. A large quantity of charcoal was found within the feature matrix; a radiocarbon date derived from this charcoal was 3230 ± 60 B.P. (Beta-57130), suggesting an affiliation with the Terminal Archaic or early Transitional period. No artifacts, other than FCR,

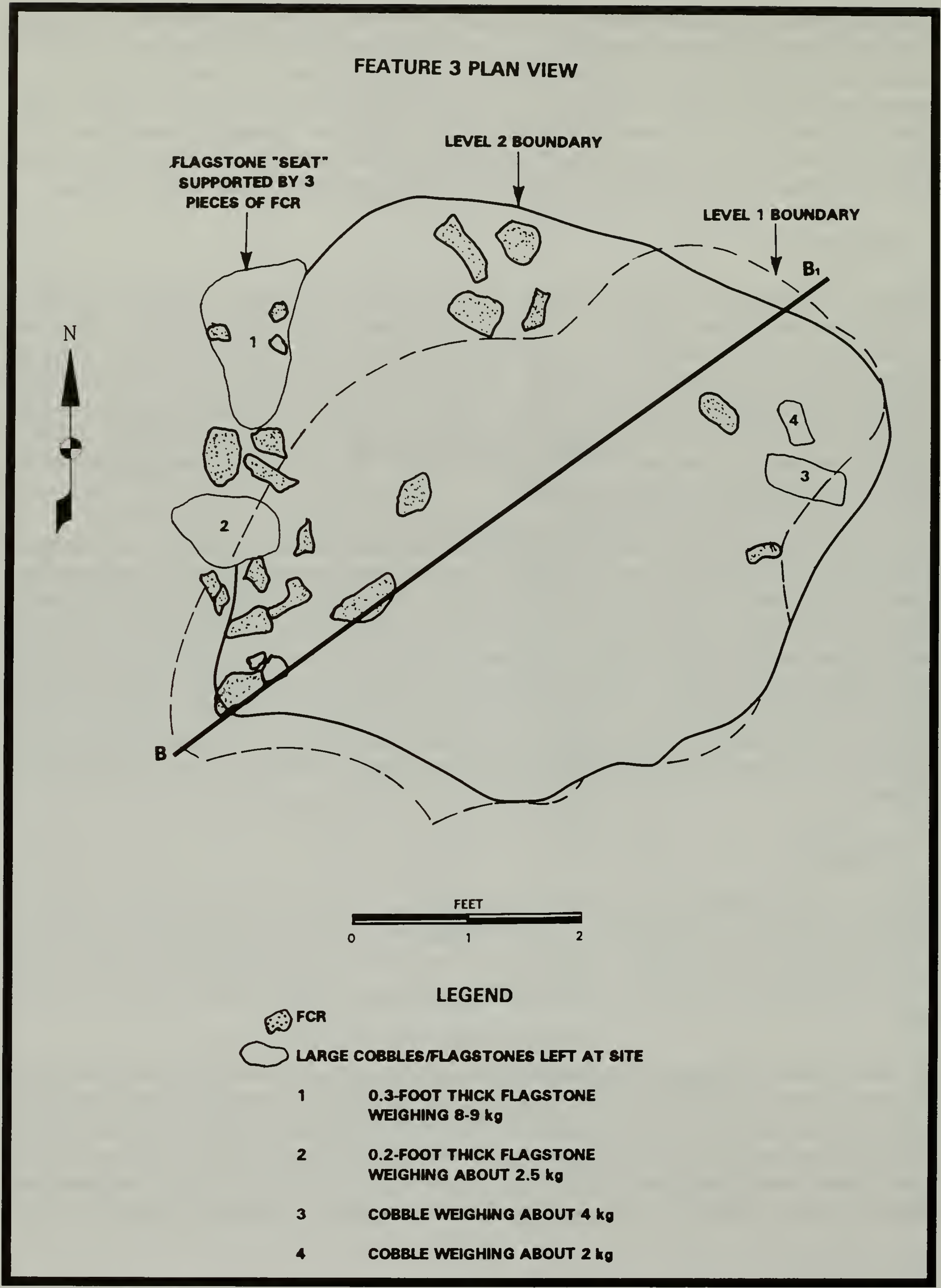
FEATURE 3 PLAN VIEW
LEVEL 2 BOUNDARY
FLAGSTONE "SEAT" SUPPORTED BY 3 PIECES OF FCR
LEVEL 1 BOUNDARY
N
B
B1
1
2
3
4
FEET
0
1
2
LEGEND
FCR
LARGE COBBLES/FLAGSTONES LEFT AT SITE
1 0.3-FOOT THICK FLAGSTONE WEIGHING 8-9 kg
2 0.2-FOOT THICK FLAGSTONE WEIGHING ABOUT 2.5 kg
3 COBBLE WEIGHING ABOUT 4 kg
4 COBBLE WEIGHING ABOUT 2 kg

FIGURE 7 Feature 3, Plan View of Levels 1 and 2

were recovered from the screened sample from this feature. The heavy fraction recovered from the flotation sample included a single jasper early reduction flake, four unidentified calcined bone fragments, and over 700 smaller fragments of FCR with a total weight of 18.7 kg. The total weight of FCR from Feature 4, 116.3 kg, is more than four times that of the FCR from Feature 3, which had the next largest quantity. The configuration and large amount of FCR suggested that Feature 4 was a platform hearth roughly comparable to, although smaller than, Comfort Station Feature 1, which contained 213 kg of FCR (see Chapter IV).

5. Feature 5

No feature was assigned this number.

6. Feature 6

Feature 6 was situated 23 feet east of Radius Point C-2 and 120 feet north of DL-1, at an elevation of 373.7 feet amsl (see Figure 4). Feature 6 consisted of a concentration of FCR within a 0.4-foot-deep basin that measured about 2 feet in diameter (see Figure 6; Plate 3). No artifacts other than FCR were found associated with Feature 6. The soil matrix was a dark yellowish brown (10YR 4/4) sandy loam with flecks of charcoal, slightly darker than the surrounding yellowish brown (10YR 5/4) sandy loam deposits. Excavation of the feature recovered over 50 fragments of FCR with a combined weight of about 10 kg. The FCR, which was discarded in the field, included conglomerate, quartzite, and sandstone rocks that probably originated from river cobbles. The cultural affiliation of this possible prehistoric hearth pit could not be determined.

7. Feature 7

Feature 7 was situated 61 feet east of Radius Point C-2 and 135 feet northeast of DL-1, at an elevation of 371.8 feet amsl (see Figure 4). Feature 7 consisted of a cluster of seven FCR and two unmodified pebbles in an area measuring about 1.0x0.8 feet (Plate 4). The FCR, which consisted of seven quartz and sandstone rocks with a total weight of 0.9 kg, was within a yellowish brown (10YR 5/4) sandy loam that, except for some charcoal flecking, was indistinguishable from the surrounding or underlying soil. No artifacts other than FCR were located in this vicinity. Feature 7 may represent the remains of a small hearth.

8. Feature 8

Feature 8 was situated 71 feet east of Radius Point C-2 and 144 feet northeast of DL-1 at an elevation of 372.1 feet amsl (see Figure 4). The feature consisted of hard-packed soil covering an oval area approximately 4x7 feet in size, with the long axis running north-south. Feature 8 contained six pieces of FCR with a total weight of 1.1 kg and two stone tools, one an argillite Fox Creek point and the other a very large chopper crudely flaked from shale. The soil matrix surrounding these artifacts was a 10YR 4/4 dark yellowish brown fine sandy loam that contained flecks of charcoal. There was a 2-foot-diameter circular stain of 10YR 5/3 brown soil near the southwest corner of the feature. Feature 8 may be a disturbed hearth or activity locus.

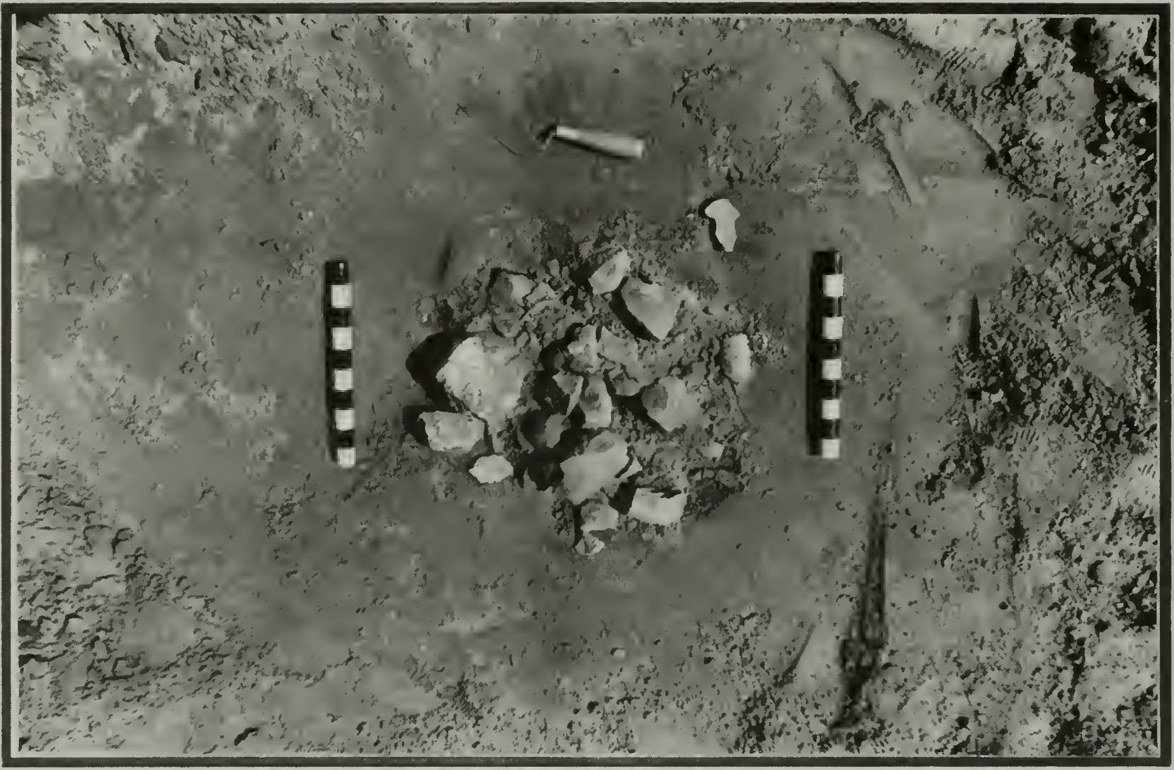

PLATE 3: Feature 6, View to East

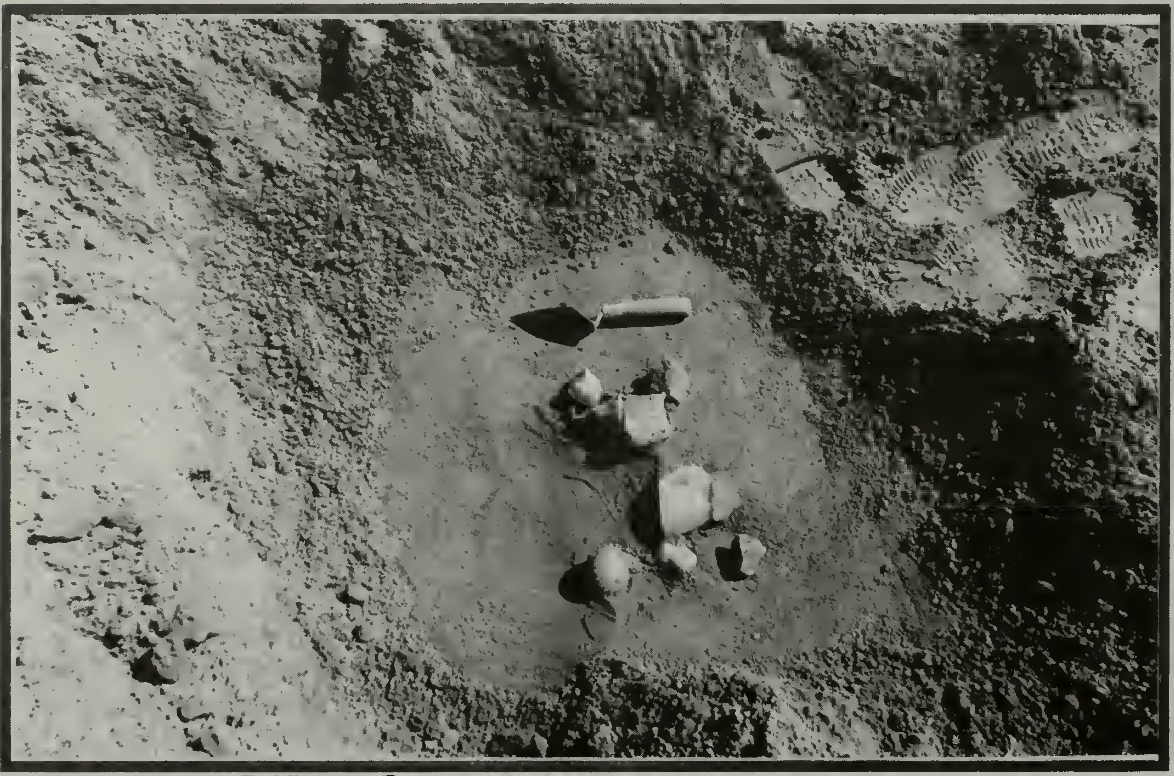

PLATE 4: Feature 7, View to East

9. Feature 9

Feature 9 was an extensive artifact concentration located 83 feet northeast of Radius Point C-1 and 110 feet northeast of DL-1. The concentration measured approximately 18x9 feet and was at an elevation of 371.2 feet amsl (see Figure 4). Following surface collection, two contiguous 5x5-foot units (Units 1 and 2) were excavated directly over the central portion of the feature. Unit 1 was excavated in eight 0.3-foot levels that extended from 371.2 to 368.7 feet amsl. The soil profile consisted of dark yellowish brown (10YR 4/4) and brown/dark brown (10YR 4/3) sandy loam with charcoal flecking. The lower horizons of the soil profile exhibited some lamellae development (Figure 8).

Surface collection produced 1 chert, middle-stage biface; 164 flakes and flake fragments; 4 soapstone vessel fragments; and 5 pieces of FCR. A total of 156 of the flakes, or 95 percent, were chert; of the remaining 8 flakes, 7 were metasedimentary and 1 was metarhyolite. Only four of the flakes had cobble cortex.

Unit 1, Level 1, produced a Susquehanna Broadspear point and a projectile point tip, both chert; 6 soapstone vessel fragments; over 100 flakes, all but one of them chert; and 8 pieces of FCR. Level 2 produced a possible netsinker fragment, over 30 chert flakes, and another 6 soapstone vessel fragments. Level 3 saw a drastic reduction in the quantity of artifacts; only 4 flakes were recovered. In Level 4, 12 flakes, 7 of them argillite, and 2 FCR were recovered. Twenty-six flakes, all but one of them argillite, were recovered from Level 5. Level 6 produced 9 flakes, all but one of them argillite. The final two levels excavated, Levels 7 and 8, did not contain any artifacts. Forty-eight additional pieces of debitage were recovered from Unit 1 flotation samples, 75 percent of these from Level 1. Aside from one quartz fragment, all of the debitage was chert.

It is interesting to note that although no argillite was recovered from Levels 1-3, 60 percent of the flakes from Levels 4-6 were argillite. This contrast in raw material composition suggests that the area might contain superimposed components. The relative gap between components, as well as the sterile lower levels of the excavation, is associated with coarser-grained sandy soils that may represent flood deposits (see Figure 8).

Unit 2 was excavated to expand the investigation of Feature 9 and to pursue the possibility that multiple components were present. Also excavated in eight levels, Unit 2 extended from 370.9 to 368.2 feet amsl. The quantity of artifacts in Unit 2 was less than in Unit 1; however, concentrations of flakes were observed on the surface. A total of 39 flakes, 2 pieces of FCR, and 1 fragment of a soapstone vessel were recovered from Level 1 in Unit 2. Level 2 produced only 6 flakes and Level 3 yielded only 2 flakes, one of which was the only jasper artifact from this feature. Level 4 produced 1 argillite flake, and Level 5 yielded 1 metasedimentary flake and 2 small pieces of FCR. Level 6 did not contain any artifacts, but Level 7 produced a single chert flake. Level 8, the last level excavated, was sterile.

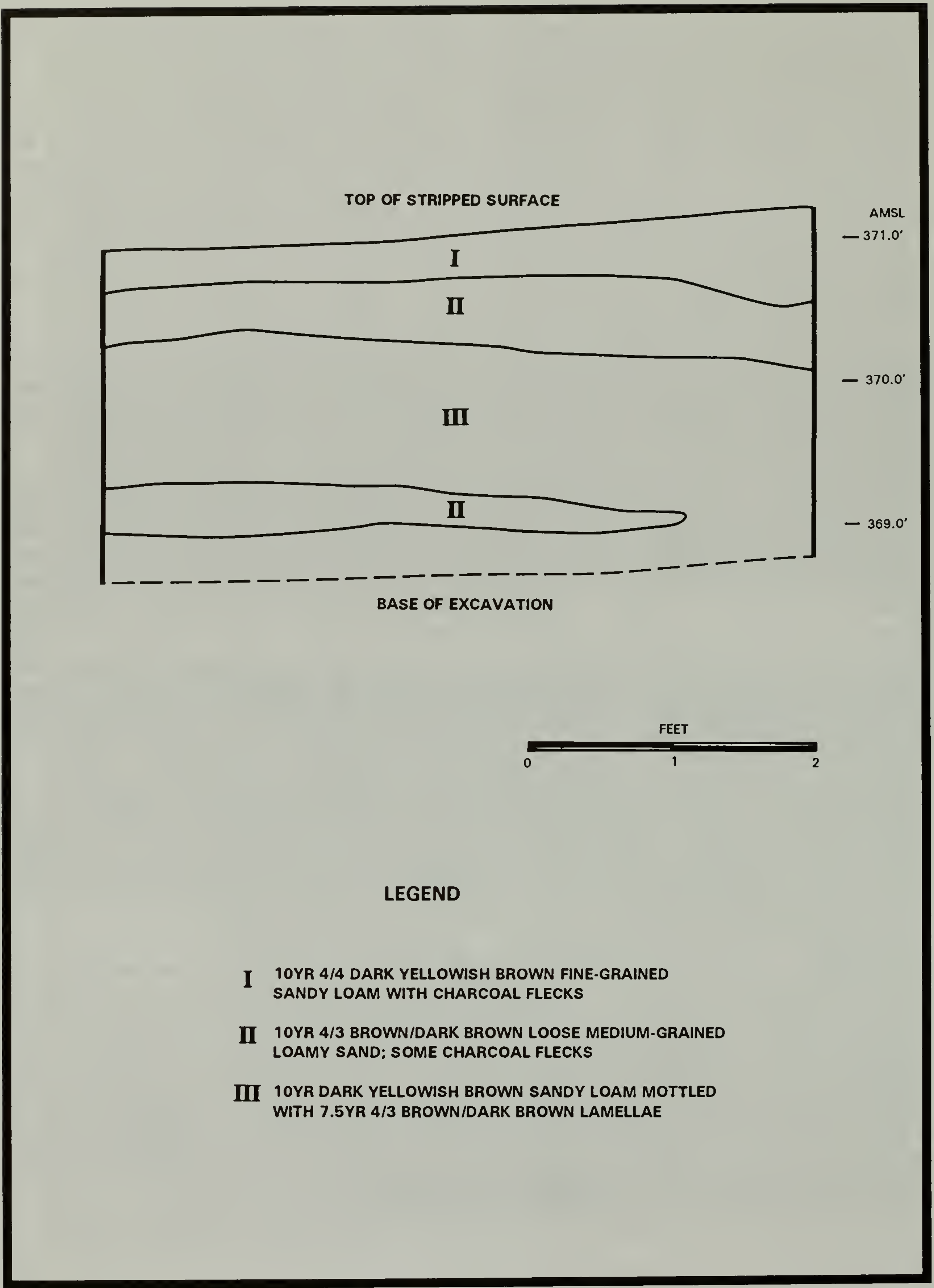
TOP OF STRIPPED SURFACE
AMSL
371.0'
370.0'
369.0'
I
II
III
II
BASE OF EXCAVATION
FEET
0
1
2
LEGEND
I 10YR 4/4 DARK YELLOWISH BROWN FINE-GRAINED SANDY LOAM WITH CHARCOAL FLECKS
II 10YR 4/3 BROWN/DARK BROWN LOOSE MEDIUM-GRAINED LOAMY SAND; SOME CHARCOAL FLECKS
III 10YR DARK YELLOWISH BROWN SANDY LOAM MOTTLED WITH 7.5YR 4/3 BROWN/DARK BROWN LAMELLAE

FIGURE 8 Unit 1, West Profile

Feature 9 is interpreted as representing superimposed activity areas. The soapstone fragments from the surface and upper levels suggest a Transitional period association. Artifacts from deeper levels in the unit excavations may represent Late Archaic occupation at the site.

C. SOUTH SIDEWALK REPLACEMENT

One of the tasks associated with replacement of the Lower Boat Ramp was the removal and replacement of an existing sidewalk (see Figure 4). This task also involved the regrading and cutting of an existing slope in addition to slope stabilization. Removal of the pre-existing sidewalk was not monitored; however, an archeologist was present during the cutting of the bank and grading of a 40x6-foot area for the new sidewalk.

Between 0.5 and 3.0 feet of previously undisturbed soil deposits were removed from this area. The underlying deposit consisted of a homogeneous yellowish brown (10YR 5/4) sandy loam with some redder banding (lamellae). Three isolated pieces of FCR were noted along the 40-foot-long profile. Otherwise, no artifacts or cultural features were found in this vicinity during archeological monitoring.

VI. ARTIFACT ANALYSIS

A. METHODS

After cleaning, all artifacts were separated into lithic and ceramic categories and were then identified further by morphological and functional type. All artifacts were counted and weighed in grams. Metric measurements of length, width, and thickness were made, where appropriate. Flotation samples were processed using a Flote-tech flotation device, manufactured and marketed by R.J. Dausman Technical Services, Inc. This system separates light and heavy fractions from the soil matrix. Artifacts recovered from the heavy fraction included FCR, debitage, pottery, and ceramic bead fragments. The light fractions contained calcined bone and botanical material, which included wood charcoal and dietary remains.

Observations on temper, thickness, and surface treatment were used to describe the ceramic assemblage. Where possible, sherds were associated with previously defined ware types (e.g., Kinsey 1972b; Kraft 1975). Lithic artifacts were grouped into specific types based upon key morphological attributes, which are linked to or indicative of particular stone tool production or reduction strategies. Tool function was inferred from morphology as well as from use-wear that could readily be observed on surfaces and edges.

Archeological monitoring at the Lower Boat Ramp at Dingmans Launch recovered 565 prehistoric lithic artifacts, 157 prehistoric ceramic artifacts, 154 kg of FCR, and faunal and botanical specimens (Table 2). A complete artifact inventory is provided in Appendix 3. The lithic assemblage consisted of 22 bifacial, unifacial, cobble, and groundstone tools and tool fragments; 3 cores; 523 pieces of debitage; and 17 fragments from soapstone bowls. The ceramic assemblage consisted of vessel sherds, daub, bead fragments, part of a ceramic smoking pipe, and indeterminate ceramic fragments. The botanical assemblage included seven carbonized beans, quantities of nutshell, seeds, and various wood specimens (see Appendices 1 and 2). The faunal assemblage contained a single deer mandible of probable modern origin, 1 shell, and 731 mostly unidentifiable bones and bone fragments.

As required by the National Park Service, final cataloging of artifacts was performed using the Automated National Cataloging System (ANCS), which is produced on a dBase program. All artifacts were packaged for curation in vented polyethylene bags and acid-free cardboard boxes and will be housed permanently at the Delaware Water Gap National Recreation Area (DEWA). ANCS numbers (for example, DEWA 60,722) are used to track artifacts within park collections.

B. PREHISTORIC CERAMICS

The prehistoric ceramic assemblage from the Lower Boat Ramp consisted of 145 sherds and indeterminate ceramic fragments, 6 pieces of daub, 2 bead fragments, and 4 fragments from a single ceramic pipe. A total of 45 sherds were recovered from surface collection and screened

TABLE 2

ARTIFACT SUMMARY BY FEATURE

Feature	Lithic Tools	Cores	Debitage	FCR (kg)	Faunal	Ceramics and Steatite
1	1 netsinker 1 celt 1 pestle 1 anvil/chopper 1 metate 2 teshoas	2	21	7.98	198	100 pottery sherds 4 pipe fragments 6 daub 1 other ceramic
[illegible]	1 biface 1 teshoa	1	17	0.06	515	44 pottery sherds 2 bead frags.
3	2 points 1 biface 1 hammer/mano 1 atlatl weight 1 anvil		36	16.50	15	
4			1	116.29	4	
6				~10		
7				0.88		
8	1 point 1 chopper			1.15		
9	2 points 1 biface 1 netsinker		439	0.74		17 steatite sherds
Unprov.	1 mano					

NOTE: No feature was assigned the number 5 samples. Many of the remaining 100 sherds and possible sherd fragments that were recovered from flotation samples were too small to identify definitely as remains of vessels or, when they were so identified, by ware type. The two bead fragments that were recovered came from flotation samples.

At least two ware types were identified in the assemblage. The first type is represented by 37 sherds with sand temper, all of which were recovered from Feature 1. Several of the sherds were crossmended and most of them may belong to a single vessel. The interior surfaces are plain and the exteriors are plain and burnished (Plate 5). Two sherds from a vessel shoulder have similar shallow incised diagonal lines (Plate 6). One ware type from the Upper Delaware with this type of shoulder decoration is Bainbridge Linear, which has been dated circa 1250-1400 (Kinsey 1972b:467; Werner 1972:112). The date range for this type is not inconsistent with the radiocarbon date of 740 ± 80 B.P. obtained for Feature 1.

The other ware type or types from the Lower Boat Ramp include eight grit-tempered sherds, most of which were tiny body fragments. Two of the grit-tempered sherds were recovered from Feature 1 and the remaining six were from Feature 2. One of the examples from Feature 1 is a rim sherd with a castellation and two incised lines parallel to the lip (see Plate 6). This sherd is undoubtedly Late Woodland in age. Of the six examples from Feature 2, four are undecorated body sherds and the other two are decorated with deep incised lines and probably represent collar fragments. On one sherd, the portion of the design consists of four parallel lines running diagonal to the rim; the other sherd has multiple perpendicular lines (Plate 7). Both of these sherds are similar to Late Woodland collared vessels with incised motifs, such as Durfee Underlined and Munsee Incised, that are common in the Upper Delaware, for example, at the Zimmermann Site, two miles north of Dingmans Ferry. These ware types are generally dated after circa 1450 (Kinsey 1972b:470, 473-475; Werner 1972:110-111), which is several centuries later than the radiocarbon date obtained for Feature 2.

A total of 61 fragments of pottery (34.9 g) were recovered from Feature 1 flotation samples and 38 fragments (3.8 g) were recovered from Feature 2 flotations. The mean weight of the sherds from the Feature 1 flotation samples was 0.6 g, compared to the average sherd weight of 4.4 g for the sand-tempered pottery sherds and 2.6 g for the grit-tempered sherds from the screened samples from Feature 1. The fragments of pottery recovered from the Feature 2 flotations were mostly crumbs, with an average weight of only 0.1 g.

The pipestem, which was from Feature 1, has a coarse temper similar to the grit-tempered sherds from Features 1 and 2. This pipe portion is undecorated. Ceramic pipes are found in Late Woodland contexts in the Upper Delaware, although they are relatively rare (Werner 1972:114). Six fragments of daub, with a total weight of 12.1 g, were also recovered from Feature 1, suggesting that there may have been a structure in the vicinity (Plate 8).

The two ceramic bead fragments were recovered from Feature 2 flotation samples. Both of these fragments were incised and may be from a single bead. The larger of the fragments had a diameter of about 13 mm, with a bore hole measuring about 1.5 mm across.

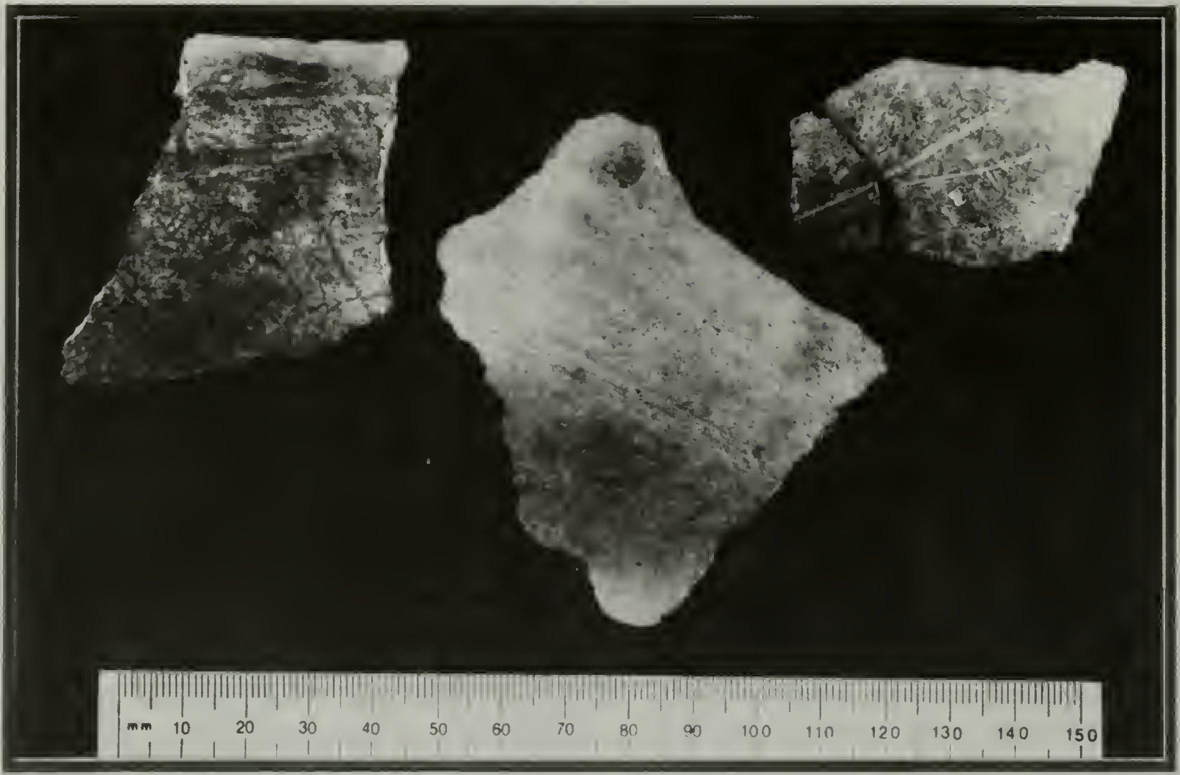

PLATE 5: Body Sherds from Sand-tempered Ceramic Ware, Feature 1 (DEWA 60,700; DEWA 60,697; DEWA 60,714)

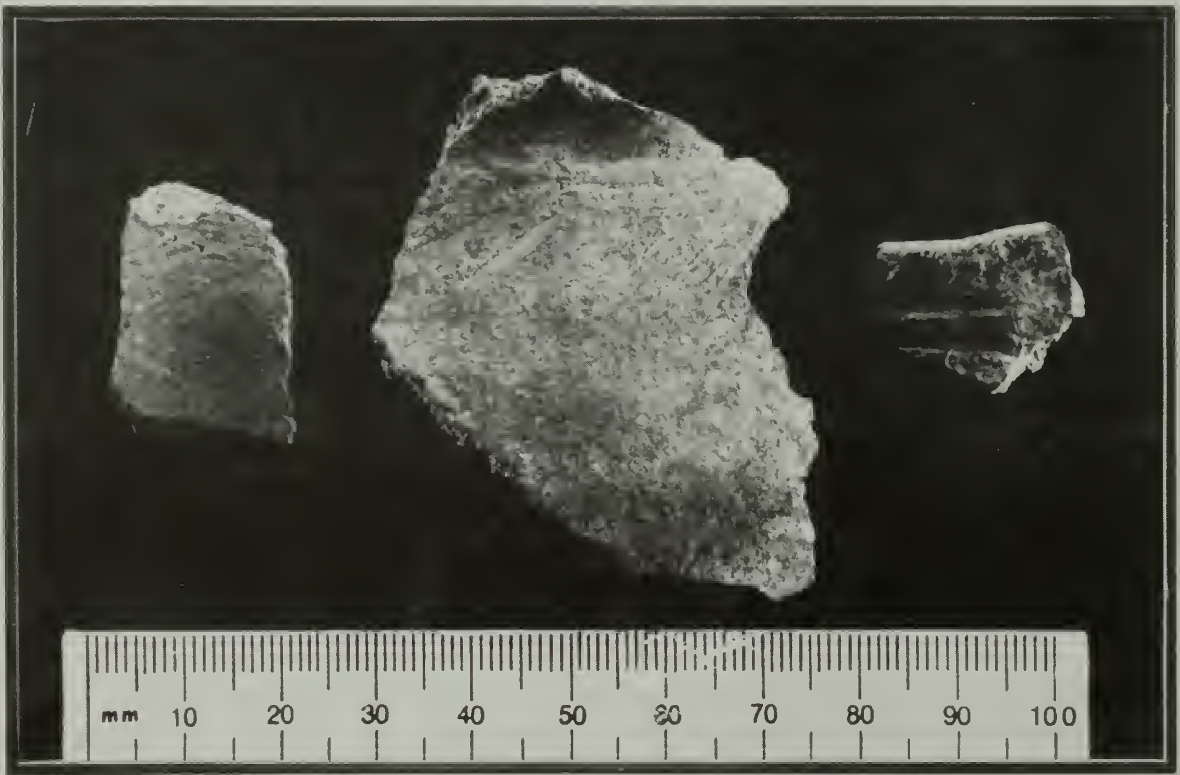

PLATE 6: Decorated Sherds from Feature 1 (DEWA 60,692; DEWA 60,702; DEWA 60,711)

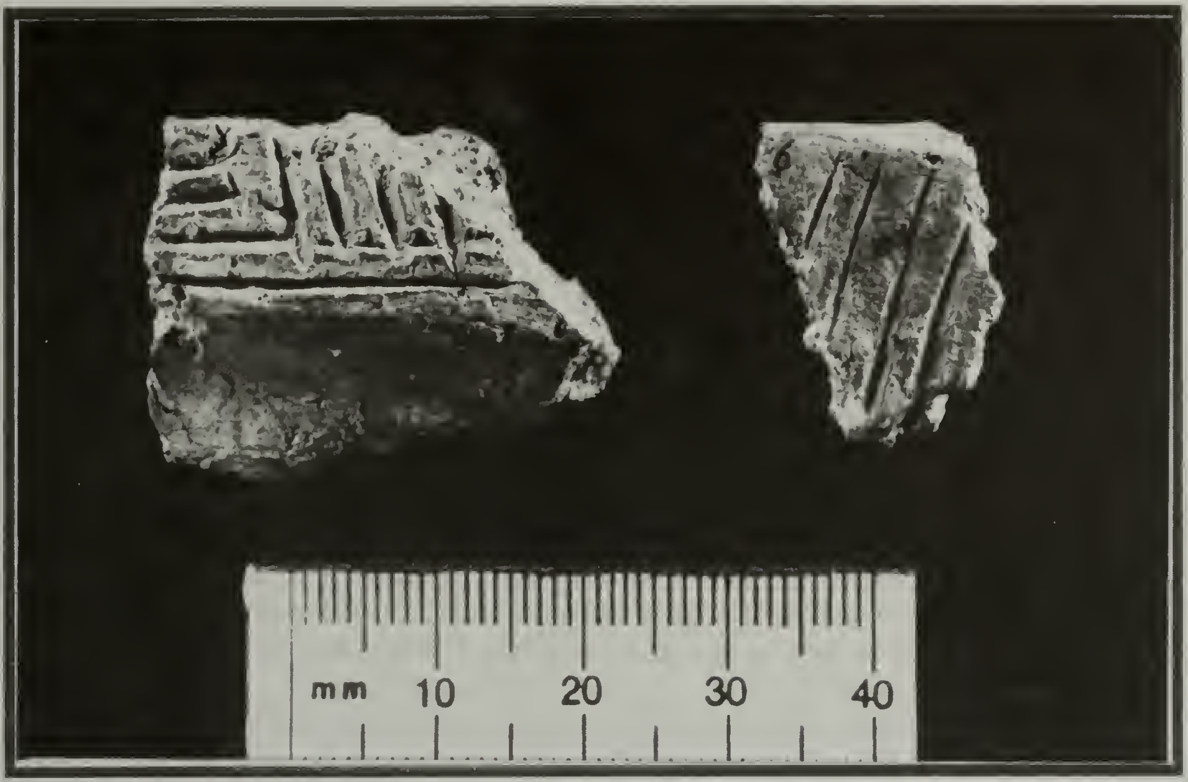

PLATE 7: Decorated Collar Sherds from Feature 2 (DEWA 60,722; DEWA 60,725)

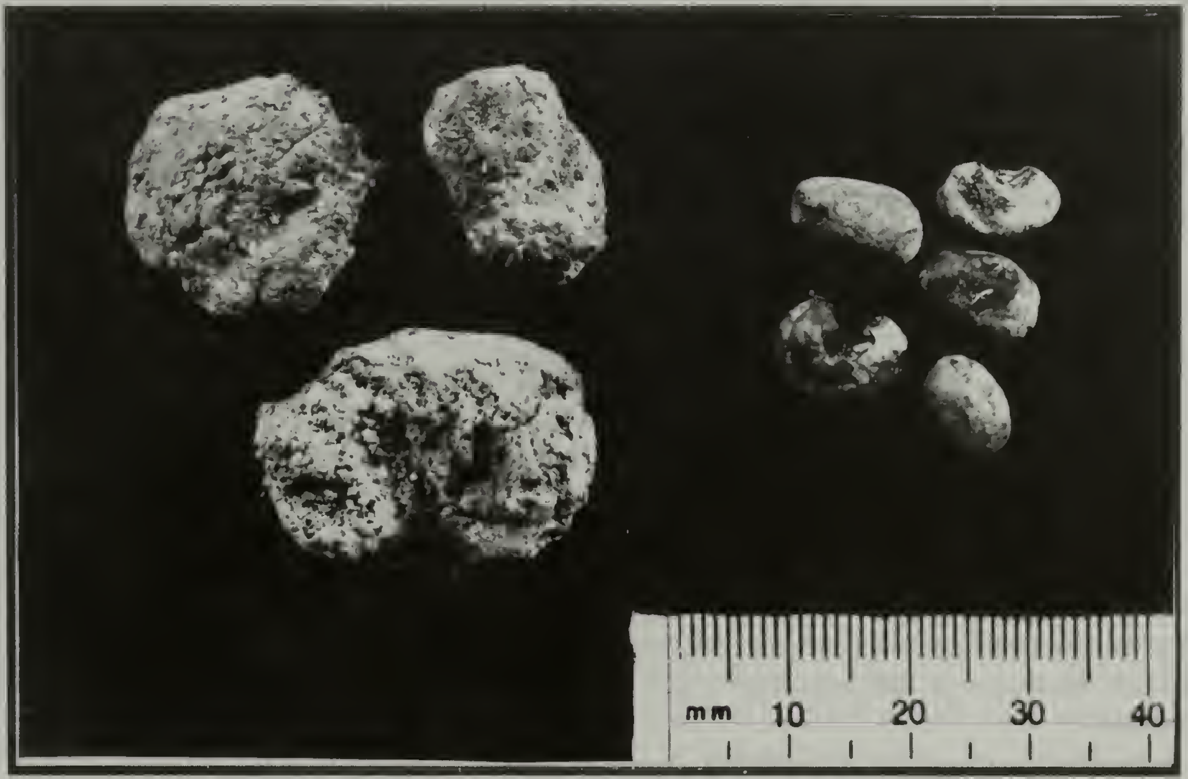

PLATE 8: Daub and Carbonized Beans from Feature 1 (DEWA 60,693; DEWA 60,695)

C. LITHIC ANALYSIS

1. Lithic Artifact Categories

Most of the features identified during monitoring were characterized by clusters of fire-cracked rock. FCR includes all fragments of lithic debris that could not be attributed to stone tool production. These fractured cobbles and/or chunks of local bedrock are believed to have been components of heating and/or cooking facilities.

Artifacts associated with lithic reduction activities included debitage, hammerstones, anvil stones, a single middle-stage biface, and three bipolar core fragments. Debitage consisted of decortication flakes, early reduction flakes, block and flake shatter, biface reduction flakes, and flake fragments.

Decortication flakes are the first series of flakes detached during lithic reduction. They are characterized by 50 percent or more cortex covering their dorsal surface. Early reduction flakes, which are detached from early-stage bifaces or freehand percussion cores, have less than 50 percent dorsal cortex, usually fewer than four dorsal flake scars, and irregularly shaped platforms with minimal faceting and no lipping. Platform grinding is not always present on early reduction flakes. Biface reduction flakes are generated during the middle and late stages of biface reduction and also during biface maintenance. They are characterized by multiple overlapping dorsal flake scars and small elliptically shaped platforms with multiple facets. These distinctive platforms represent slivers of what was previously the edge of a biface. Also, the platforms of biface reduction flakes typically show evidence of grinding.

Block shatter consists of angular or blocky fragments that do not possess platforms or bulbs. Generally the result of uncontrolled fracturing along inclusions or internal fracture planes, block shatter is most frequently produced during the early reduction of cores and bifaces. Block shatter is also common in bipolar reduction (Hayden 1980), and has been referred to as "primary shatter" (Binford and Quimby 1963).

Flake shatter consists of small, flat fragments or splinters that lack platforms, bulbs, and other obvious flake attributes. Flake shatter is generated throughout a reduction sequence but is most common in later stages of reduction. It is also a common by-product of bipolar reduction, and has been referred to as "secondary shatter" (Binford and Quimby 1963). Trampling of debitage on living surfaces also generates flake shatter, while thermal fracturing produces both flake and block shatter. The last category of debitage, flake fragments, represents sections of flakes that are too fragmentary to be assigned to a particular flake type.

The middle-stage biface, as the name suggests, is midway in the reduction process and, therefore, represents an unfinished bifacial tool. Middle-stage bifaces are characterized by lenticular cross section, sinuous edges, and sometimes patches of cortex remaining on one or both faces.

Lithic implements recovered from the site included projectile points, bifaces, unifaces, cobble tools, and ground and polished tools. Projectile points are finished bifaces that were usually hafted and functioned primarily as projectiles and/or knives. The unifaces from the site included teshoas, a term for a large flat flake struck from a cobblestone and used as an expedient tool (Kraft 1966, 1986:139, 140), and a bipolar core fragment with unifacial edge damage. Kraft (1972:41-42) has suggested that teshoas, which are ubiquitous in the Upper Delaware valley, commonly in Late Woodland contexts, were used for many purposes, including cutting, chopping, scraping, and digging.

Various cobble tools were recovered from the boat ramp area. Functional types included hammerstones, anvil stones, manos, metates, netsinkers, and pestles. Hammerstones and anvils are functional names that refer to use in lithic reduction. Hammerstones, which are cobbles with evidence of battering and crushing along their margins, may have been used as percussors for other processing tasks, in addition to lithic reduction. Anvil stones are cobbles or blocks of rock that were used as a base on which to rest materials while they were struck with a hammer. Surfaces that are interpreted as anvils tend to possess shallow, coarse-textured depressions with amorphous outlines. Implements classified as anvil stones may have been used for lithic reduction and for food preparation tasks, such as breaking nuts and acorns.

Netsinkers are commonly made from cobbles by removing a few flakes from opposite ends to facilitate attachment to a cord. Some specimens functioned as true netsinkers, while others could have functioned as bolas stones or even canoe anchors (Kraft 1975). A distinct type of netsinker found in the Upper Delaware is made from a relatively flat pebble or platy rock that has been notched and carefully chipped into a rectangular shape (Kraft 1972:23). This type has been associated with Late Woodland assemblages.

Manos and metates, also referred to as mullers and milling stones (see, for example, Kinsey et al. 1972), were used for grinding food and sometimes pigment. Manos are typically unmodified cobbles with a smoothed surface that resulted from use and metates, flat stone slabs that exhibit characteristic wear and/or staining.

2. Lithic Raw Material Analysis

The utilization of different lithic raw materials reflects technological needs as well as patterns of group mobility and exchange. Raw materials in the Lower Boat Ramp assemblage were identified on the basis of macroscopic observations of color, texture, hardness, inclusions, and cortex. Magnification was used on occasion to identify inclusions. Geological and archeological type specimens housed at the LBA archeology laboratory in East Orange, New Jersey, were used for comparative purposes. Raw material analysis placed artifacts into eight different types.

The term "chert" is used for a range of cryptocrystalline quartz. Several types of chert are present in the assemblage, but most of it is black to dark gray or dark bluish gray in color. The potential sources for the chert in the assemblage include river cobbles and local sedimentary formations. Cobbles of this material can be found in gravel bars along the Delaware, and bedrock outcrops are known to exist in the Delaware Water Gap area (R. Michael Stewart and Robert Wall, personal communication 1991). Minor amounts of several other cherts are included in the assemblage, and these may represent extralocal sources such as Onondaga chert from New York State.

Jasper is another form of cryptocrystalline quartz that is fine-grained and usually tan to brown in color. There are several known sources of jasper in the region (see, for example, Hatch and Miller 1985), mostly 50 to 60 miles southwest of the project area.

Argillite is indurated mudstone or claystone, which, because of its fine texture and hardness, can be effectively flaked. Large deposits of argillite are common in the Middle Atlantic region (Didier 1975). The argillite artifacts in the assemblage compare favorably with argillites from the Delaware valley, but the ultimate source of these items is uncertain. All of the argillite artifacts from the boat ramp area are highly weathered with a chalky exterior.

Rhyolite is a metavolcanic rock with characteristic crystal clasts. Rhyolite, or more accurately metarhyolite, derives from lavas and exhibits flow structure and distinctive phenocrysts. Sources of metarhyolite are found in the South Mountain area of Pennsylvania and Maryland, more than 150 miles southwest of the Dingmans Ferry project area. This relatively discrete source was the focus of prolonged and widespread utilization in the Middle Atlantic region (Stewart 1984a). The presence of South Mountain rhyolite at Dingmans Launch is an indication of population mobility and/or exchange patterns. Long-distance trade in metarhyolite from the South Mountain area was well established by the Late Archaic/Transitional period (Stewart 1984b:30).

Whereas chert, argillite, and rhyolite in the Lower Boat Ramp assemblage were mostly restricted to chipped-stone tools, local metasedimentary rocks were represented in the assemblage by implements such as choppers, a celt, a netsinker, a pestle, grinding stones, and anvils. The term "metasedimentary" has been used to refer to a variety of local siltstones and shale-like rocks. Because of their strength and their ubiquity in the project area, these rocks were commonly used for larger implements and for site furniture, such as the flagstones at the perimeter of Feature 3 (see Figure 7).

Part of an atlatl weight made of banded slate was recovered from Feature 3 and provides further evidence of trade in lithic materials or artifacts. Banded slate, which originates from the Ohio River valley, is typically associated with Adena trade. Almost all banded slate artifacts from the Middle Atlantic region are atlatl weights of the birdstone and boatstone variety.

Soapstone or steatite was present in Feature 9 in the form of several sherds of stone vessels. The particular sources for soapstone, which was used to made stone vessels, have not been identified; however, soapstone would have been available along the Delaware valley about 50 miles south of Dingmans Ferry (Schrabisch 1917).

3. Lithic Artifacts

Two diagnostic projectile points—a broken Susquehanna Broadspear and a Fox Creek type—were recovered from the boat ramp monitoring (Plate 9). The Fox Creek point, found in Feature 8, was made of argillite. It is 42.1 mm long, 24.6 mm wide, and 6.9 mm thick. Ritchie (1971) dates this type to the Middle Woodland, circa A.D. 360-450. The Susquehanna point was found in two pieces in Feature 9 (Unit 1), but it was missing a large portion of the tip. It was made from a high-quality gray/tan chert that is probably not local to the Upper Delaware. This Susquehanna point is 6.5 mm thick, 20.0 mm wide at the base, and 29.4 mm wide at the shoulder. The portion that was recovered measures 47.5 mm long, but the original length is estimated to have been about 65 mm. The dimensions of this point are comparable to the assemblage of nine Susquehanna Broadspears recovered from the Zimmermann Site, located two miles north of Dingmans Ferry. More than half of the Susquehanna Broadspear points reported in Kinsey (1972b:427) were made from nonlocal rhyolite and one-third were made from chert. A radiocarbon date of 1650 ± 80 B.C. was derived from the Susquehanna component at the Zimmermann Site (Kinsey 1972b:430; Werner 1972:64-65). Kinsey (1972a:353-354) stated that, with the exception of the Zimmermann Site, Susquehanna Broadspears were rare in the Delaware valley below Milford, with Perkiomen and Lehigh broadspear types being more common. Previous investigations at 36Pi136 recovered a single argillite Perkiomen point (Alterman 1991:65).

Other bifaces from the boat ramp area included a mid-section of an untyped chert projectile point and a chert biface fragment from Feature 3; a biface fragment and a middle-stage biface, both chert, from Feature 9; a crudely flaked chopper from Feature 8; and an anvil stone from Feature 1 with bifacial flaking along the side, perhaps for use as a chopping tool (see below).

A portion of an atlatl or spearthrower weight of polished banded slate was recovered from Feature 3. This object has two vertical perforations, approximately 46 mm apart, and a groove on the ventral surface which would have accommodated binding to a wooden shaft. The artifact has been broken through both drilled perforations (Plate 10). At Indian Knoll, Webb (1974:250-251) indicated that atlatl weights were commonly broken before being placed with burials as a grave good. In general form and material, the atlatl weight from Dingmans Launch is similar to artifacts referred to as boatstones and birdstones, which are associated with the Early Woodland period. Birdstones of colorful banded slate have been found in Meadowood phase components in the Middle Atlantic region, dated circa 1200-300 B.C. (Kraft 1986:95). A birdstone of banded slate was recovered, in association with soapstone vessels, from the Meadowood phase Sinking Ponds Site in New York (Granger 1978:118). Boatstones are a common Adena or Middlesex phase trait, and occur primarily in burials (Ritchie 1980:201-204). Similar atlatl weights and other banded slate artifacts were recovered in the Upper Delaware valley at the Rosenkrans Site, which is located about eight miles south of Dingmans Ferry, in Sussex County, New Jersey. The component at the Rosenkrans Site consisted of 13 graves that contained at least 16 identifiable cremated and inhumed individuals (Kraft 1986:98-104). The single radiocarbon date derived for the Rosenkrans Site was 610 ± 120 B.C. (Ritchie 1980:204). The atlatl weight from Feature 3 at Dingmans Launch was not associated with either a potential burial pit or bone remains.

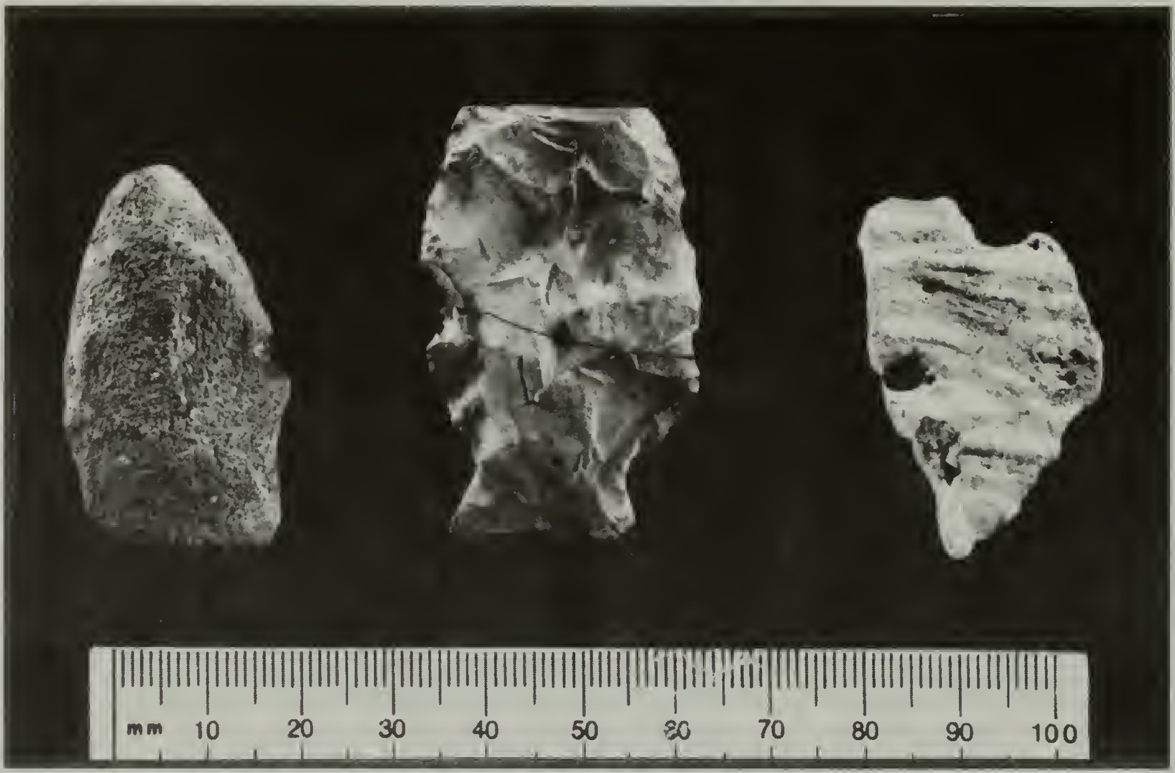

PLATE 9: Projectile Points and Soapstone Sherd (DEWA 60,743; DEWA 60,760; DEWA 60,770)

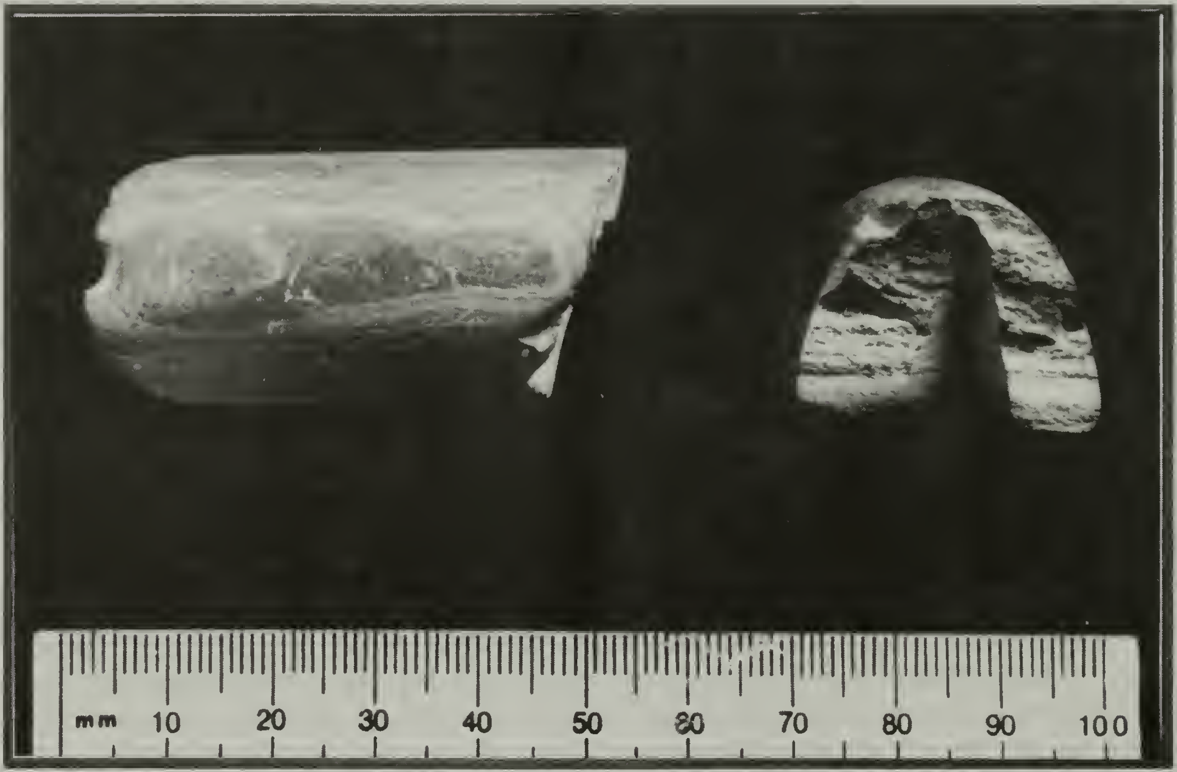

PLATE 10: Top and Section Views of Banded Slate Atlatl Weight from Feature 3 (DEWA 60,731)

The other groundstone tool from the boat ramp was a portion of a celt, found in four fragments in Feature 1. The surviving portion of the celt, which displayed evidence of fire-cracking, measured 106x40x28 mm; it was made from what appears to be local metasedimentary rock (Plate 11).

One intact netsinker of the trimmed rectangular type was recovered from the boat ramp area in Feature 1 (Plate 12). This netsinker, made from a thin (9 mm) piece of metasedimentary rock, measures 62 mm in length by 48 mm in width. A Late Woodland date for this artifact type is consistent with the age of the feature based on associated ceramics and a radiocarbon date.

Three examples of teshoas were recovered from the boat ramp area. Two were from Feature 1 and the other from Feature 2. These teshoas were all primary flakes from metasedimentary cobbles and have clearly utilized edges. The length of these tools ranged from 26 to 52 mm (see Plate 12).

Lithic artifacts from the site associated with food preparation activities included a pestle, manos, a milling stone or metate, and soapstone bowl fragments. In addition, anvil stones from the site may have been used for food preparation as well as lithic reduction (see above).

The artifact identified as a pestle or pestle preform was a large elongated cobble retrieved from Feature 1 that was pecked along most of its outer surface (Plate 13). This artifact was split lengthwise and may have been discarded before it was completed. The shape of the artifact and its size (242x75x46 mm) compares with the pestles from the Bell-Browning Site, located about three miles north of Dingmans Ferry, in Sussex County, New Jersey (Marchiando 1972:139, 147). The major occupation of the Bell-Browning Site was during the Late Woodland and Contact periods, circa A.D. 1200-1700.

Three artifacts with anvil-type damage were recovered from the site, two from Feature 1 and the other from Feature 3. The two artifacts from Feature 1 included a bifacial chopping tool with pitting on one surface, and a milling stone or metate with striations and shallow pits (see Plate 13). The third example was a more typical anvil tool, often referred to as a bipitted cobblestone or pitted hammerstone; it is a large cobble (1.2 kg) with pecked depressions on both sides and no other obvious utilization on the edges or surfaces (Plate 14). A smaller cobble tool, weighing 0.4 kg, was classified as a hammerstone based on edge damage, but also exhibits wear typical of use as a mano (Plate 15). Another cobble classified as a mano was a metasedimentary cobble, weighing 0.5 kg, with a worn surface, that was recovered during monitoring from an unprovenienced (non-feature) location.

There were a total of 17 fragments of soapstone cooking vessels recovered from the boat ramp area, all from Feature 9; most of them were extremely small. The largest sherd, which retained a portion of a repair hole, measured 11.2 mm thick (see Plate 9), and another sherd retained some charred residue on the interior. The association of soapstone with the Susquehanna point confirms the Transitional period date for the upper levels of Feature 9. Ritchie (1980:157) reported that the association of Susquehanna points with soapstone sherds, which he referred

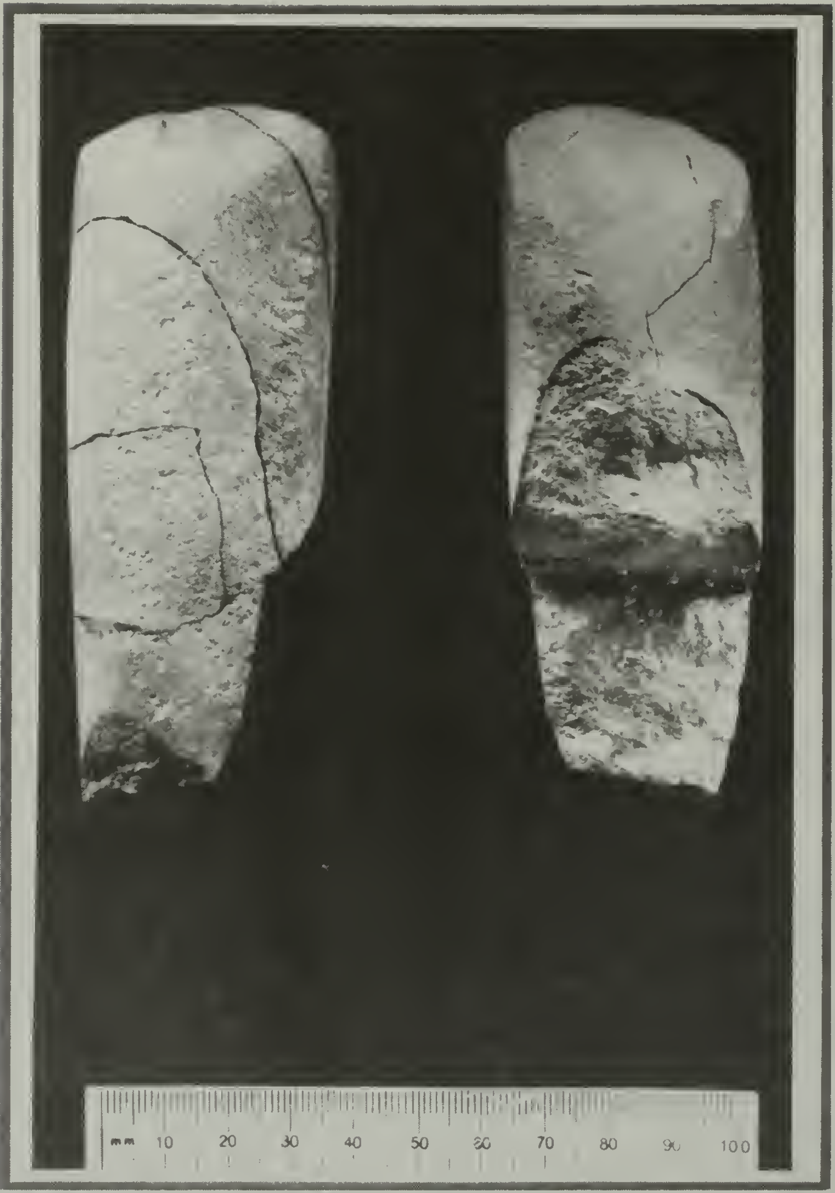

PLATE 11: Obverse and Reverse Views of Mended Celt from Feature 1 (DEWA 60,688)

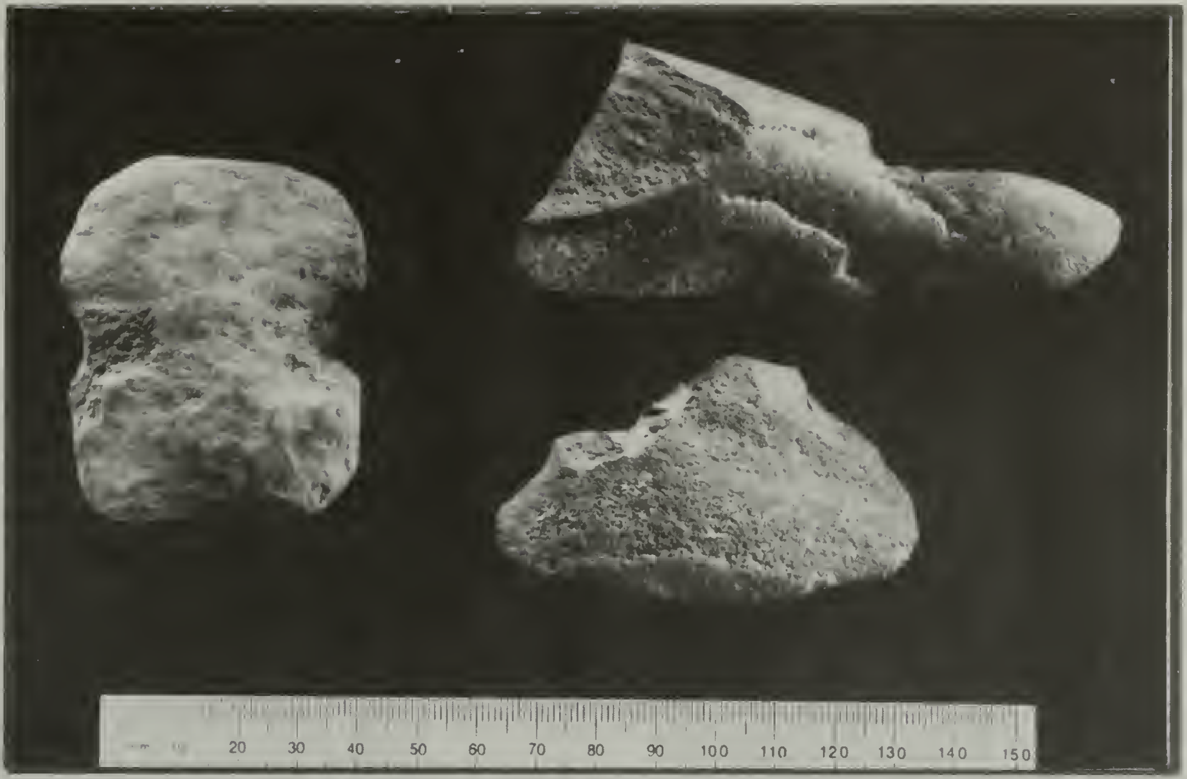

PLATE 12: Netsinker and Teshoas from Feature 1 (DEWA 60,684; DEWA 60,719; DEWA 60,705)

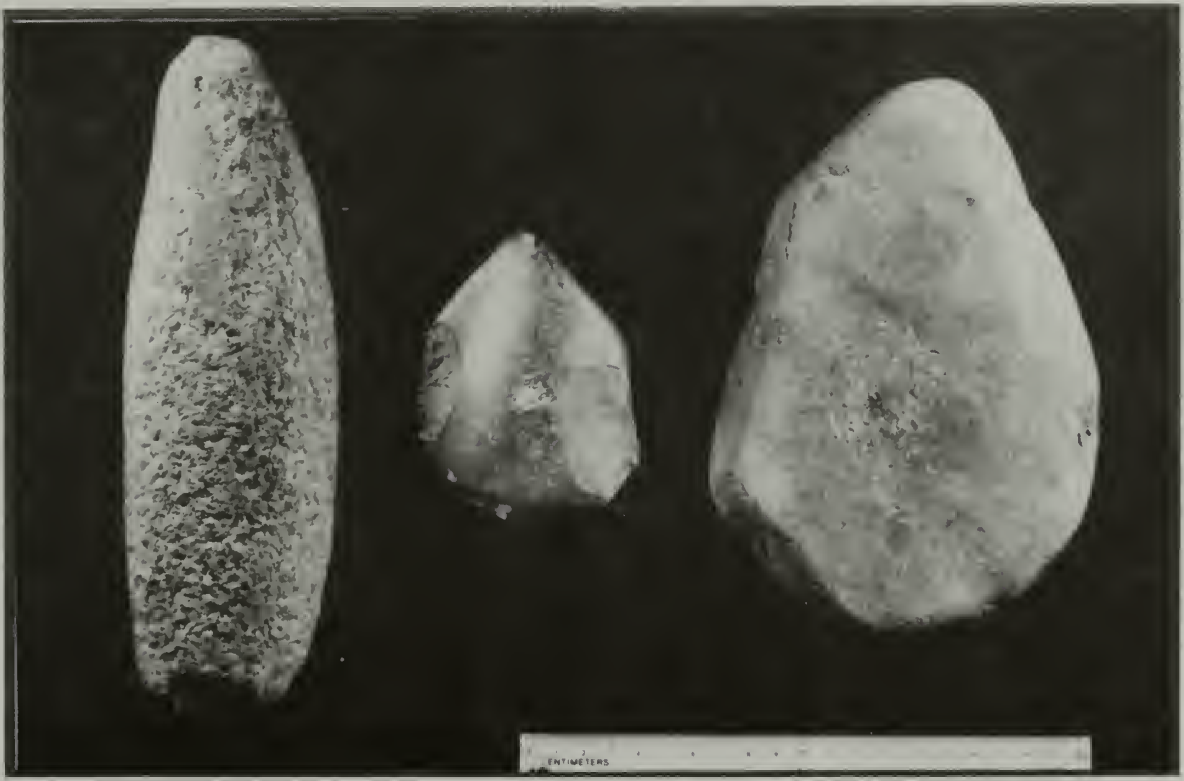

PLATE 13: Pestle, Chopper/Anvil, and Metate/Anvil from Feature 1 (DEWA 60,689; DEWA 60,706; DEWA 60,715)

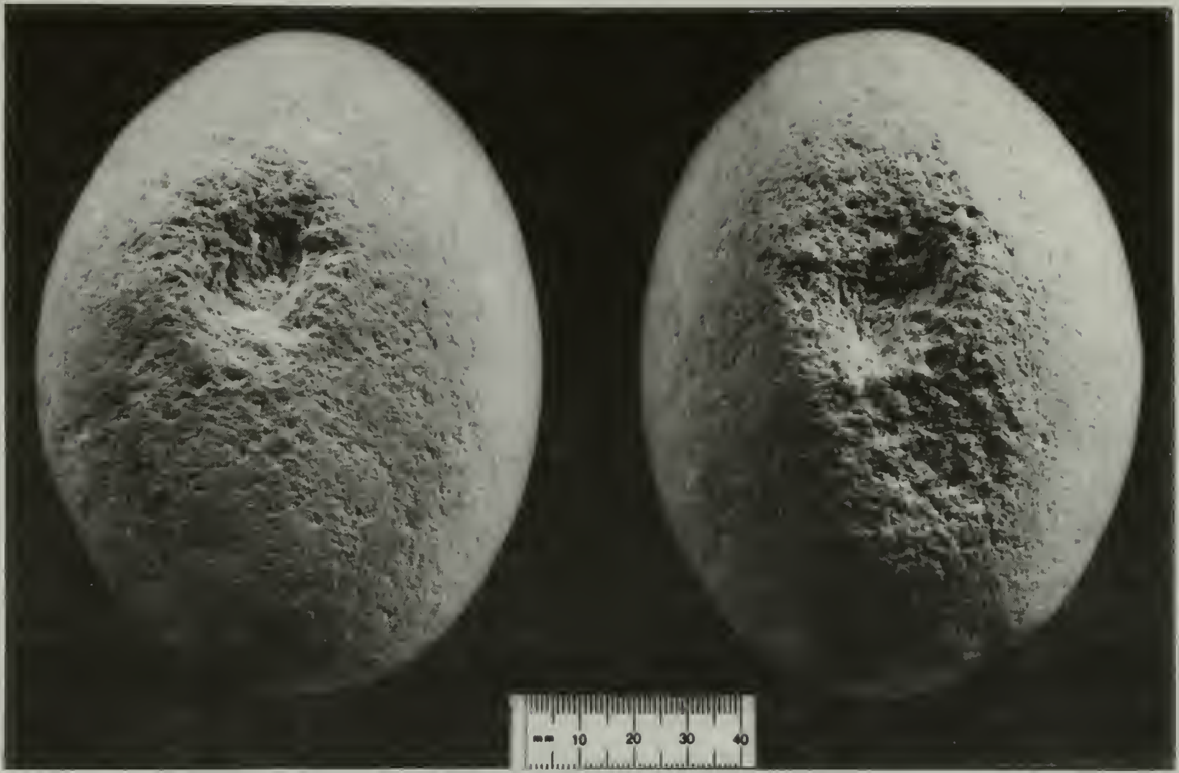

PLATE 14: Obverse and Reverse Views of Pitted Cobble from Feature 3 (DEWA 60,732)

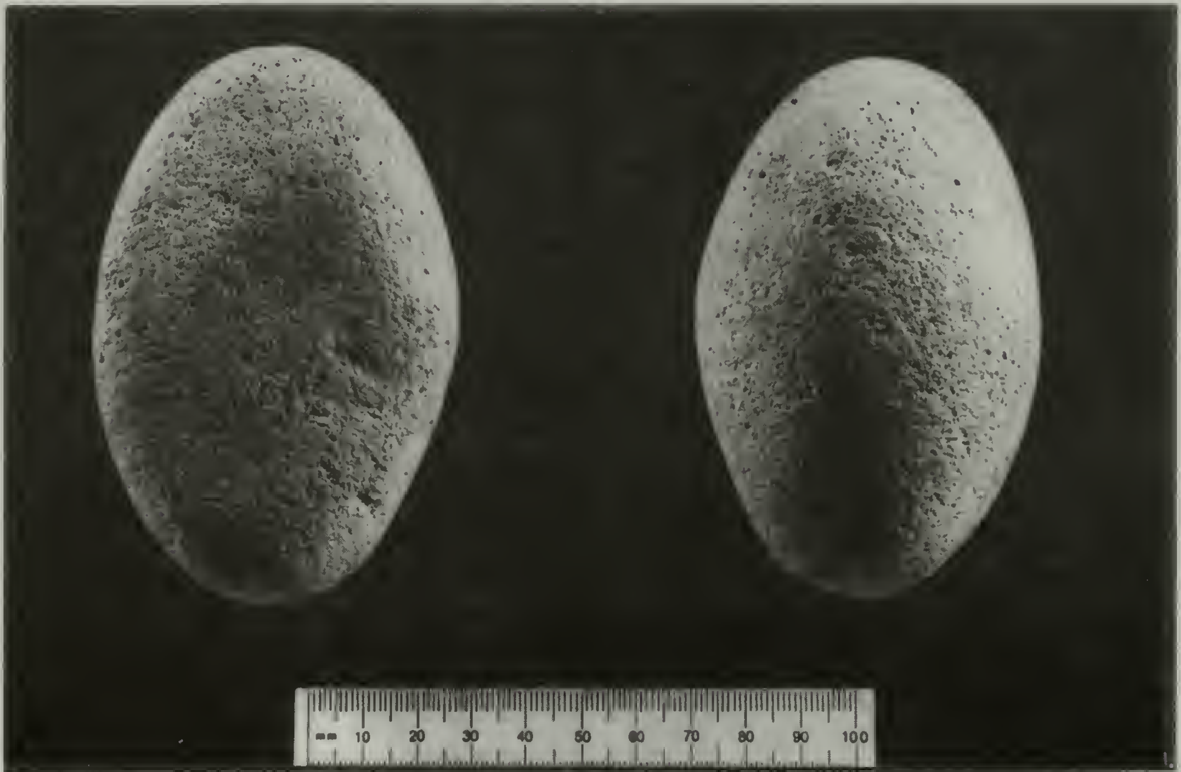

PLATE 15: Obverse and Reverse Views of Mano/Hammerstone from Feature 3 (DEWA 60,729)

to as the Frost Island complex, has a wide distribution along the Susquehanna River in Pennsylvania and its tributaries in New York. In the Upper Delaware, soapstone vessels were reported from the Zimmermann Site, but not from the Susquehanna component at that site. The soapstone bowls from Zimmermann were in a so-called Dry Brook component, dated circa 1200 B.C., which Werner (1972:71-82) suggested was transitional between the Susquehanna and Orient Fishtail components at that site. No soapstone remains were recovered during previous investigations at 36Pi136.

There were 529 pieces of debitage in the assemblage, 411 recovered from screened samples and 118 from flotation samples. Within the screened sample, chert was the predominant raw material, represented by 340 specimens, or 83 percent of the debitage. Other raw materials, in descending order of frequency, were argillite (N = 46), metasedimentary (N = 17), rhyolite (N = 5), quartzite (N = 2), and jasper (N = 1). Within the flotation samples, chert was represented by 97 specimens, or 82 percent. Aside from two quartz flakes, the remainder of the debitage recovered from flotation was jasper, represented by 19 flakes. This is significant given the near absence of jasper from the screened sample. Jasper accounted for 9 of the 14 pieces of debitage from the Feature 1 flotation samples, 6 of the 21 pieces from Feature 2, and 1 early reduction flake, the only artifact other than FCR recovered from Feature 4.

Eliminating the 193 unidentified flake fragments, the debitage from the screened sample consisted of 108 biface reduction flakes, 102 early reduction flakes, 2 decortication flakes, 5 pieces of flake shatter, and 1 piece of block shatter. The relative frequency of biface reduction flakes, flake shatter, and block shatter was much greater within the flotation samples, accounting for 33, 23, and 8 specimens, respectively, compared with only 5 early reduction flakes.

A comparison of the ratio of early reduction flakes to biface reduction flakes by raw material suggests some interesting patterns. Combining these two types, 75 percent of the metasedimentary flakes and 66 percent of the argillite flakes are early reduction flakes. In contrast, early reduction flakes account for only 38 percent of the chert and 33 percent of the jasper. No rhyolite early reduction flakes were identified in the assemblage, which contained three rhyolite biface reduction flakes. Lithic reduction activities involving several types of raw material were taking place in the boat ramp area; however, where the proportion of biface reduction flakes is highest—among chert, jasper, and rhyolite—it is presumed that tool finishing and resharpening activities are represented.

Three jasper bipolar core fragments were recovered from flotation samples, two from Feature 1 and the other from Feature 2. The bipolar core fragments were very small, weighing 0.9 g, 0.4 g, and 0.2 g, respectively. The largest one had some unifacial damage along one edge. The paucity of cores and core fragments from the boat ramp area, and Dingmans Launch in general, suggests that initial lithic reduction activities may have taken place at quarry sites.

Some of the features in the boat ramp area were distinguished by large quantities of FCR. A total of 116.3 kg of FCR was recovered from Feature 4. This included 96 pieces (97.6 kg) collected in the field and over 700 smaller fragments (18.7 kg) retrieved in the heavy fraction of flotation samples. In descending order, the other features contained the following quantities of FCR: Feature 3 (27.0 kg), Feature 2 (16.3 kg), Feature 1 (7.9 kg), Feature 6 (10.0 kg), Feature 8 (1.1 kg), Feature 9 (1.0 kg), and Feature 7 (0.9 kg). The mean weights of FCR fragments recovered in flotation samples from Features 1, 2, and 3 were 6.1 g, 2.5 g, and 2.8 g, respectively, compared with the mean weight of the Feature 4 sample, which was 26.6 g. This contrast provides further confirmation of the distinctive nature of the FCR from Feature 4.

D. FAUNAL REMAINS

A portion of a deer mandible was also recovered from the north half of Feature 1 (see Appendix 3). This bone was not calcined and is probably a modern specimen. A total of 735 calcined bones and 1 small clam shell were retrieved from flotation samples (see Appendix 3). A total of 686, or 94 percent, of the bones were not identifiable to element or species. Of the remaining 49 bones, 1 was a vertebra of an unidentified fish species, 4 may be from a turtle, 21 were from a medium mammal (probably deer), 1 was from a small mammal, 16 were from mammals of undetermined size, and 2 were possibly from bird species. The bone elements representing medium mammals included 18 longbone fragments, 2 carpal or tarsal fragments, and 1 phalange. The bone element identified as being from a small mammal was a whole metatarsal. The distribution of bone remains was 198 from Feature 1, 519 from Feature 2, 14 from Feature 3, and 4 from Feature 4. Feature 2 contained 70 percent of the bone, including the only fish and possible turtle bone. The single bivalve came from Feature 3.

E. FLORAL REMAINS

Paleobotanical remains included seven charred beans, which were recovered from the north half of Feature 1 (see Appendix 3), and wood, nutshell, seeds, and corn parts from flotation samples. A total of 25 flotation samples representing 471 liters of fill were analyzed by Kathryn E. Parker (see Appendix 1). Overall, wood charcoal was the most abundant botanical material, with a total weight of 198.75 g. Eight local tree types were represented among the 190 identified wood fragments. Oaks (*Quercus* spp.), especially red oak (*Quercus erythrobalanus*), and hickory (*Carya* spp.) comprised 70 percent of the identifiable wood fragments. The other identifiable species, in descending order of frequency, were pine (*Pinus* spp.), poplar (*Populus*), chestnut (*Castanea dentata*), black walnut (*Juglans nigra*), sycamore (*Platanus occidentalis*), and beech (*Fagus grandifolia*).

There were 3,814 fragments of nutshell, with a total weight of 64.62 g, representing the following types: hickory (*Carya* spp.), hickory/walnut family (Juglandaceae), black walnut (*Juglans nigra*), and acorn (*Quercus* spp.). A total of 3,678 fragments (62.11 g), representing 96 percent of the sample of recovered nutshell, was from Feature 3. Sixty-six percent of the sample could be identified only to the hickory/walnut family, and not to species. Of the remaining nutshell, 19 percent was identified as hickory and 14 percent as black walnut. Acorn shell accounted for less than one percent of this sample.

The largest number of the 81 identifiable seeds, 26, was from an unknown grass, Poaceae Type X. These seeds presumably were gathered incidentally during collection of grass stems, perhaps for matting. This type of seed occurred only in the sample from Feature 1. Of the seeds representing food remains, the most numerous was the common bean (18), followed by pokeweed (12), sunflower (6), and elderberry (5). Other identifiable seeds included bedstraw, sedge, knotweed, sumac, raspberry/blackberry, viburnum, and grape. Ninety-seven of the 110 seeds from the flotation samples came from Feature 1. The plant foods recovered from flotation samples include domesticates and fleshy fruits. Sunflower (*Helianthus annuus*), which occurred in Features 1, 2, and 3, was domesticated as early as the Late Archaic in the Midwest. The size of the relatively intact achenes from the Feature 1 samples suggests a late prehistoric context (see Heiser 1985:57-61; Yarnell 1978:289-299). The fruits represented in the sample (raspberry/blackberry, sumac, and grape) were valued resources among historic Native American groups (Moeller 1992). Seeds from pokeweed, the sedge and bean families, bedstraw, knotweed, and viburnum are interpreted as remains of naturally occurring plants in the site vicinity, although it is possible that some of these were used for medicinal purposes (Moeller 1992:113).

Maize (*Zea mays*) was represented by 249 fragments that weighed 2.84 g. A total of 157 (63 percent) of these fragments were kernels and most of the remainder were cupules. As with the seeds, the majority of the recovered maize, 92 percent of the sample, was from Feature 1. The remainder of the identified maize was from Feature 2. The relatively intact kernels and cupules suggested that the maize was typical of the Eastern Eight row type within the Northern Flint cultivar (see Appendix 1).

No nutshell, seeds, or maize fragments, and only very little wood, were recovered from the flotation samples taken from the Unit 1 and 2 excavations of Feature 9, and the only botanical specimens from Feature 9, other than wood, were three nutshell fragments and a single raspberry/blackberry seed.

In summary, paleobotanical remains included wood species, grasses that may have been used for matting, and food remains. Three cultivated plants were identified: beans, maize, and sunflower. Wild plant foods were represented by nuts and fruits.

The common bean (*Phaseolus vulgaris*) was the only domesticated bean to reach the prehistoric eastern United States. Bean, which has been identified from as early as A.D. 1000 at Roundtop, near Binghamton, New York (Yarnell 1976:272), joined maize and squash to form the basic Late Woodland agricultural crops and was the last of these three cultigens to reach the East from the Southwest/Mesoamerica.

Pokeweed (*Phytolacca americana*) was used by numerous Native American groups as a food and a medicine. The Oklahoma Delaware used the roots of the plant (Tantaquidgeon 1972:120-122), and the Pamunkey of Virginia drank a tea of the boiled berries of pokeweed (Weiner 1972:113), both as a remedy for rheumatism. Dried root of poke was included in the official *U.S. Pharmacopoeia* from 1820 to 1916 as a pain reliever and a cure for inflammation (Weiner

1972:113). The Oklahoma Delaware also used the roots of one species of viburnum, known as black haw, as a medicine for female uterine problems (Tantaquidgeon 1972:123-124).

Plant remains are good indicators of site seasonality. Hickory nuts, for example, would have been collected, and processed, in September and October. Grape would also have been collected in the fall, while raspberry/blackberry ripens in the early summer. Maize would have been harvested in the fall, when it matures, and could be stored after being dried (Moeller 1992:56-57).

In addition to processing flotation samples from the Lower Boat Ramp, soil samples taken from Comfort Station Feature 1 during the 1990 excavations at Dingmans Launch (Alterman 1991) were processed and analyzed for this report (see Appendix 2). A total of 75 liters of fill from this feature were processed. Most of the identifiable floral material was wood charcoal, having a total weight of 0.9 kg. The only wood types identified were oak, especially red oak (*Quercus Erythrobalanus*), and hickory (*Carya* spp.). Recovered nutshell consisted of 350 fragments with a combined weight of 3.76 g. Black walnut was the most abundant type; also present were hickory, acorn, and hazelnut (*Corylus americana*). Three seeds of fleshy fruit were identified, one each of huckleberry (*Gaylussacia* sp.), raspberry/blackberry (*Rubus* sp.), and knotweed (*Polygonum* sp.). The knotweed seed is of a different species than *Polygonum erectum*, which was a prehistoric cultigen.

VII. SUMMARY

Previous investigations at 36Pi136 at Dingmans Launch documented prehistoric remains from the Late Archaic through the Late Woodland periods. Archeological monitoring during reconstruction of the Lower Boat Ramp at Dingmans Launch provided additional information on artifacts, features, and components represented at this site. Eight prehistoric features were identified during monitoring; these were designated Features 1 through 4 and Features 6 through 9, with no feature assigned the number 5. Features included hearths, rock platforms, tool clusters, and possible pits, some of which produced diagnostic artifacts of previously unidentified site components. Features 1 and 2 contained ceramics, lithic artifacts, and remains of cultigens that represent multiple Late Woodland occupations. From Feature 3, a banded atlatl weight represents an Early Woodland Adena/Meadowood component. A projectile point from Feature 8 is a Middle Woodland Fox Creek type. Feature 9 appeared to contain stratified components: a Susquehanna Broadspear projectile point and soapstone vessel fragments are associated with a Transitional period occupation, while deeper lithic scatters may date to the Late Archaic.

Evidence was retrieved of various site activities, including tool manufacturing and maintenance activities and food procurement and processing. Tools, such as projectile points and the atlatl weight, are remnants of hunting gear, and the netsinker would have been used for fishing. The anvil stones, pestle, and milling stones are food preparation tools, and soapstone bowls and pottery were used for cooking. Food remains from the site included bones of small- and medium-sized mammals, a clam shell, and possible bird and turtle bones. The exploitation of wild plant foods was indicated by the presence of nutshell, particularly in Feature 3, and small quantities of seeds, fruit, and berries. Cultigens, which included beans, maize, and sunflower, were present as well.

Lithic reduction activities are represented by various types of flakes, shatter, small bipolar core fragments, and a single middle-stage biface. The use of nonlocal raw material in stone tool production was clearly indicated by the presence of rhyolite and jasper, and possibly argillite. Moreover, several implements, particularly the banded slate atlatl weight, but also the soapstone vessel fragments, were made of nonlocal materials, and may have been trade goods.

The lithic materials represented in the assemblage include both local and nonlocal stone. Chert was by far the most prevalent lithic raw material, and most of it is presumed to be of local origin. Examples of possible nonlocal chert include the Susquehanna Broadspear point. The argillite and jasper originated from outside the immediate vicinity of the project area, probably from eastern Pennsylvania. The metarhyolite and banded slate in the assemblage, however, came from more distant sources. The metarhyolite originated in the South Mountain area of Pennsylvania and Maryland, over 150 miles southwest of Dingmans Ferry; the banded slate may have originated in Ohio.

Procurement of shaley rocks, available less than 1 km from the site, was casual compared to the exploitation of at least some of the chert, and the argillite, rhyolite, and jasper. Different materials were sought for their suitability for particular tools or tasks. Some nonlocal lithic materials may have been acquired during seasonal settlement rounds. The use of nonlocal materials varies with the type of settlement system and the type of exchange patterns.

There are numerous sources of jasper in the Reading Prong of Pennsylvania's Great Valley. The best known source is at Vera Cruz, about 5 miles south of Allentown and about 60 miles southwest of Dingmans Launch (Schrabisch 1937). Schrabisch (1917:46) mentioned a source of jasper near Belvidere, New Jersey, about 30 miles south of the project area. Outcrops of soapstone are also common in the Reading Prong (Snethkamp et al. 1982:6.11, 14), one occurring along the Lehigh River near Easton, Pennsylvania (Kinsey 1971:151), and one on the Delaware just north of Phillipsburg, New Jersey (Schrabisch 1917:47); both sources are about 40 miles south of Dingmans Ferry.

Schrabisch (1917:47) described an area of Hunterdon County, New Jersey, as a great headquarters for prehistoric argillite quarries, with over 90 workshop sites located within a few miles of Flemington. Didier (1975) identified a 20-mile stretch along the Delaware between Trenton and Frenchtown which had extensive outcrops of argillite. However, the frequency of early reduction flakes of argillite from the boat ramp area suggests that there may have been a closer source for this material.

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APPENDIX 1

PLANT REMAINS FROM LOWER BOAT RAMP EXCAVATIONS AT SITE 36Pi136

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METHODS OF BOTANICAL ANALYSIS

Botanical remains recovered from the flotation of feature matrix and excavation unit samples at Site 36Pi136 (lower boat ramp excavations) were identified and evaluated. Carbonized materials in each flotation sample were separated into two size fractions with the aid of a No. 10 geological sieve (2-mm mesh). Using a standard binocular microscope at low magnification (10x), all carbonized materials in each large fraction (>2 mm) were extracted and sorted into categories (e.g., wood, nutshell, maize, seeds). Each category was subsequently weighed, and the number of items in each counted. An attempt was made to identify all nut and the first 20 randomly selected wood fragments (or all wood, if there were less than 20) in the large fraction.

In this analysis, wood charcoal fragments examined but found to be unidentifiable at least to family were grouped into one of four categories: bark, diffuse porous hardwood, ring porous hardwood, or unidentifiable. The bark category consists of small nondescript fragments identifiable only as hardwood and not pine. Diffuse porous woods include tree taxa such as maple (*Acer* spp.), beech (*Fagus grandifolia*), and poplar (*Populus* spp.). Ring porous woods may be from any one of several taxa commonly occurring in the Delaware Water Gap area, including various oaks (*Quercus* spp.), hickories (*Carya* spp.), and ash (*Fraxinus* spp.). Fragments in which all distinctive morphological traits were distorted or destroyed during carbonization were classified as unidentifiable.

The small fraction (<2 mm) was examined carefully at 10-30x for seeds, cultigen remains, grass stems, etc. Any observed were extracted, identified, and counted. Wood and nutshell counts and weights were based on materials in the large fraction only. Genus level identifications were made whenever possible. Species identifications were attempted only when morphological comparisons ruled out other members of a genus (i.e., *Phaseolus vulgaris).*

Species identifications and scientific nomenclature follow Core et al. (1979), Gleason and Cronquist (1991), and Martin and Barkley (1961).

RESULTS OF ANALYSIS

Botanical remains from 25 flotation samples representing 471 liters of fill from features and excavation units were examined. Nineteen of the samples (76%) contained identifiable floral material (Table 1). The large majority of floral remains occurred in Late Woodland Features 1 through 3. Probable Archaic Features 4 and 9 yielded little but wood charcoal, and samples from excavation units were largely devoid of charred plant material. Overall, wood charcoal was the most abundant class of material, with a total of approximately 22,271 fragments, weighing 198.75 g. However, nutshell was also abundant, totalling 3,814 fragments (64.62 g), concentrated primarily in Feature 3. Other categories of material - maize, seeds, and the stems of a large robust grass - were numerous in Feature 1, and rare in other contexts.

Wood Charcoal

A diverse array of at least eight locally occurring tree types was represented among the 190 identified wood fragments (Table 2). However, two taxa - oaks (*Quercus* spp.), especially the red subgenus (*Q. Erythrobalanus*), and hickory (Carya spp.) - together comprised the majority (70 %) of wood identified. Oak and hickory may have been selected over other equally available woods because of their superior fuel properties. Additional tree types represented, in descending numerical order, were pine (*Pinus* spp.), poplar *(Populus*), chestnut (*Castanea dentata*), black walnut *(Juglans nigra*), sycamore *(Platanus occidentalis)*, and beech (*Fagus grandifolia*). Two of these wood types, sycamore and poplar, occurred only in Archaic Feature 4 samples. Late Woodland Features 1, 2, and 3 each displayed a much higher diversity of wood types than did Feature 4, although all three features had equally high densities of wood fragments/ liter of fill. It is likely that the prehistoric residents of the site easily satisfied fuel needs from local mixed forest sources and from driftwood deposited by the nearby Delaware River.

Nutshell

Nutshell, totaling 3,814 fragments (64.62 g), was present in nine feature matrix samples. Neither Feature 4 nor any of the excavation unit samples contained nut remains. Amorphous thick-shelled fragments identifiable only as hickory/walnut family (Juglandaceae) were the most abundant type, followed by hickory (*Carya* spp.), black walnut (*Juglans nigra*), and acorn (*Quercus* spp.) (see Table 2). Nutshell was concentrated within Feature 3 samples, which yielded 96.4 % of all nut residues in the botanical assemblage. The high density and co-occurrence of several nut types within Feature 3 suggests that all available nut resources were utilized. Nuts probably were regarded as a storable resource that could be consumed throughout the year.

Table 1. Plant Remains Recovered From Flotation At Site 36PI136 (Lower Boat Launch Excavations).

Feature or Unit N.	1,N1/2	1,S1/2	1	2	2,S1/2	2,N1/2	3,N1/2	3,S1/2	4,N1/2	4,S1/2
Sample N.	1	2	4	5	6	7	8	9	10	11
Sample Volume (l)	58.0	25.0	10.0	22.0	10.0	32.0	61.0	100.0	54.0	35.0
Total Wood (N)	3590	1500	233	2739	2000	1520	2530	1280	5010	1775
Total Wood Wt. (g)	37.18	10.49	2.20	25.03	15.01	12.49	22.52	16.84	40.35	15.9
Breakdown by taxon (N)										
Carya spp. (hickory)	8	4	4	4	6	2	9	9		
Castanea dentata (chestnut)		2	4	2	1	5				
Fagus grandifolia (beech)							1			
Juglans spp. (walnut/butternut)	1		1	1			3			
Pinus spp. (pine)	1		2	7	2	5		1		
Platanus occidentalis (sycamore)						1			1	
Populus spp. (poplar)									16	
Quercus spp. (oak)		2			1	1		2		
Q., subfamily Erythrobalanus (red oak subgroup)	8	8	3	4	6	5	3	4	3	20
Bark	1	1								
Diffuse porous							2			
Ring porous	1	3	4	2	4		2	4		
Unidentifiable			2							
Total Nutshell (N)	48	19	15	5	15	31	2516	1162	0	0
Total Nutshell Weight (g)	1.14	0.37	0.18	0.06	0.28	0.46	37.59	24.52		
Breakdown by taxon (N&Wt)										
Carya spp.	16	8	15	5			574	117		
(hickory)	0.77	0.18	0.18	0.06			11.20	4.60		
Juglandaceae	30	7					1600	886		
(hickory/walnut family)	0.31	0.09					15.79	13.03		
Juglans nigra	2	2			15	31	332	158		
(black walnut)	0.06	0.09			0.28	0.46	10.55	6.88		
Quercus spp.		2					10	1		
(acorn)		0.01					0.05	0.01		
Total Seeds (N)	89	7	1	1	0	3	4	3	1	0
Breakdown by taxon										
Cyperaceae (sedge family)	1									
Fabaceae (bean family)	2			1						
Galium sp. (bedstraw)							3			
Helianthus annuus (common sunflower)	4	1				1				
Phaseolus vulgaris (common bean)	15	2	1							
Phytolacca americana (pokeweed)	12									
Poaceae (grass family)	1									
Polygonum sp. (knotweed)	1									
Rhus sp. (sumac)	2									
Rubus sp. (raspberry/ blackberry)										
Sambucus canadensis (elderberry)	5									
Unknown Poaceae Type X	26									
Viburnum sp. (viburnum)								1		
Vitis sp. (grape)								1		
Unidentifiable	20	4				2	1	1	1	
Total Maize (N)	201	24	5	8	3	8	0	0	0	0
Total Maize Weight (g)	2.48	0.21	0.04	0.04	0.02	0.05				
kernel	116	22	5	8	2	4				
cupule	70	1			1	2				
glume	10					1				
embryo	5	1				1				
Other Botanical Materials (N)	142	16	7	2	0	1	0	0	0	0
Grass stem	140	16	7	2						
Tree bud	2									
Fungus						1				

Table 1. Plant Remains Recovered From Flotation At Site 36PI136 (Lower Boat Launch Excavations).

Feature or Unit N.	9	9	9	9	9	9	9	Unit 1,L5
Sample N.	40	41	42	43	48	49	50	44
Sample Volume (l)	3.0	3.0	5.0	5.0	5.0	4.0	4.0	5.0
Total Wood (N)	2	3	4	2	15	29	20	7
Total Wood Wt. (g)	0.01	0.01	0.02	0.02	0.10	0.20	0.24	0.04
Breakdown by taxon (N)								
Carya spp. (hickory)						1	8	
Castanea dentata (chestnut)								
Fagus grandifolia (beech)								
Juglans spp. (walnut/butternut)								
Pinus spp. (pine)								
Platanus occidentalis (sycamore)								
Populus spp. (poplar)								
Quercus spp. (oak)	2							
Q., subfamily Erythrobalanus (red oak subgroup)				1		1		1
Bark								
Diffuse porous					4			
Ring porous		1	4	1	1	4	1	3
Unidentifiable		2			10	13	11	3
Total Nutshell (N)	0	0	3	0	0	0	0	0
Total Nutshell Weight (g)			0.02					
Breakdown by taxon (N&Wt)								
Carya spp. (hickory)								
Juglandaceae (hickory/walnut family)			2 0.01					
Juglans nigra (black walnut)								
Quercus spp. (acorn)			1 0.01					
Total Seeds (N)	0	0	0	0	0	1	0	0
Breakdown by taxon								
Cyperaceae (sedge family)								
Fabaceae (bean family)								
Galium sp. (bedstraw)								
Helianthus annuus (common sunflower)								
Phaseolus vulgaris (common bean)								
Phytolacca americana (pokeweed)								
Poaceae (grass family)								
Polygonum sp. (knotweed)								
Rhus sp. (sumac)								
Rubus sp. (raspberry/ blackberry)						1		
Sambucus canadensis (elderberry)								
Unknown Poaceae Type X								
Viburnum sp. (viburnum)								
Vitis sp. (grape)								
Unidentifiable								
Total Maize (N)	0	0	0	0	0	0	0	0
Total Maize Weight (g)								
kernel								
cupule								
glume								
embryo								
Other Botanical Materials (N)	0	0	0	0	0	0	0	0
Grass stem								
Tree bud								
Fungus								

Table 1. Plant Remains Recovered From Flotation At Site 36PI136 (Lower Boat Launch Excavations).

Feature or Unit N.	Unit 1,L6	Unit1,L7	Unit 2,L4	Unit 2,L5	Unit 2,L6	Unit 2, L7	Unit 2, L8	TOTALS
Sample N.	45	46	51	52	53	54	55	
Sample Volume (l)	5.0	5.0	4.0	4.0	4.0	4.0	4.0	471.0
Total Wood (N)	1	0	5	2	4	0	0	22271
Total Wood Wt. (g)	<.01		0.07	0.01	0.02			198.75
Breakdown by taxon (N)								
Carya spp. (hickory)			2					57
Castanea dentata (chestnut)								14
Fagus grandifolia (beech)								1
Juglans spp. (walnut/butternut)								6
Pinus spp. (pine)								18
Platanus occidentalis (sycamore)								2
Populus spp. (poplar)								16
Quercus spp. (oak)								8
Q., subfamily Erythrobalanus (red oak subgroup)				1				68
Bark								2
Diffuse porous					3			9
Ring porous	1		1					37
Unidentifiable			2	1	1			45
Total Nutshell (N)	0	0	0	0	0	0	0	3814
Total Nutshell Weight (g)								64.62
Breakdown by taxon (N&Wt)								
Carya spp.								735
(hickory)								16.99
Juglandaceae								2525
(hickory/walnut family)								29.23
Juglans nigra								540
(black walnut)								18.32
Quercus spp.								14
(acorn)								0.08
Total Seeds (N)	0	0	0	0	0	0	0	110
Breakdown by taxon								
Cyperaceae (sedge family)								1
Fabaceae (bean family)								3
Galium sp. (bedstraw)								3
Helianthus annuus (common sunflower)								6
Phaseolus vulgaris (common bean)								18
Phytolacca americana (pokeweed)								12
Poaceae (grass family)								1
Polygonum sp. (knotweed)								1
Rhus sp. (sumac)								2
Rubus sp. (raspberry/ blackberry)								1
Sambucus canadensis (elderberry)								5
Unknown Poaceae Type X								26
Viburnum sp. (viburnum)								1
Vitis sp. (grape)								1
Unidentifiable								29
Total Maize (N)	0	0	0	0	0	0	0	249
Total Maize Weight (g)								2.84
kernel								157
cupule								74
glume								11
embryo								7
Other Botanical Materials (N)	0	0	0	0	0	0	0	168
Grass stem								165
Tree bud								2
Fungus								1

Table 2. Summary of Identified Wood Charcoal and Nutshell.

Wood Type		Number	Percentage
Quercus Erythrobalanus (oak, red subgroup)		68	35.79%
Carya spp (hickory)		57	30.00%
Pinus spp. (pine)		18	9.47%
Populus spp. (poplar)		16	8.42%
Castanea dentata (chestnut)		14	7.37%
Quercus spp. (oak)		8	4.21%
Juglans spp. (walnut/butternut)		6	3.16%
Platanus occidentalis (sycamore)		2	1.05%
Fagus grandifolia (beech)		1	0.53%
	Total	190	100.00%

Nut Type		Number	Percentage
Juglandaceae (hickory/walnut)		2525	66.20%
Carya spp. (hickory)		735	19.27%
Juglans nigra (black walnut)		540	14.16%
Quercus spp. (acorn)		14	0.37%
	Total	3814	100.00%

Seeds

Seeds numbered 110, of which 81 were identified. The large majority were recovered from Feature 1. Seeds included representatives of several different plant categories: domesticates, edible fleshy fruits, plants probably used in technology, and some without recognizable economic value. Prehistoric domesticated plants are represented by seeds of the common sunflower (*Helianthus annuus*) and common bean (*Phaseolus vulgaris*) (Table 3). The cultivation of both plants by prehistoric populations in North America is well-established, although the origins of use and the processes of their incorporation into the native crop complex are divergent (Ford 1981 6-27; 1985:341-364).

Based on accumulated archaeological evidence, the common sunflower, a plant native to the Colorado Plateau, appears to have been cultivated as a garden crop in some areas of the Midwest at least by the Late Archaic period. Over time, through processes of selection, sunflower achenes experienced a dramatic increase in size, reaching their maximum dimensions late in prehistory. The relatively intact achenes recovered from Feature 1 in the Lower Boat Ramp area each measure over 1 cm in length, a size characteristic of domesticated specimens from late prehistoric contexts (Heiser 1985:57-61; Yarnell 1978:289-299).

In contrast, beans were a late arrival in the Eastern Woodlands. *Phaseolus vulgaris*, the only domesticated bean to enter prehistoric eastern North America, was introduced from the Southwest sometime after A.D. 800 (Ford 1981:17). Unlike sunflower, beans were not garden plants, but by the time of their arrival in the East were instead incorporated directly into the existing agricultural field complex that included maize and squash. Beans at Site 36Pi136 included both whole seeds and cotyledon fragments, the majority occurring in a single Feature 1 sample.

Fleshy fruits such as elderberry (*Sambucus canadensis*), raspberry/blackberry (*Rubus* spp.), sumac (*Rhus* spp.) and grape (*Vitis* spp.) are known to have been valued resources among historic Native American groups (Moeller 1992; Yanovsky 1936; Yarnell 1964). The seeds are also frequently encountered in Late Archaic through Late Woodland archaeobotanical assemblages, suggesting an equivalent prehistoric dietary contribution.

Seeds which reflect the use of plant materials in technology at this site are those of an unknown grass, termed Poaceae Type X. The seeds themselves are believed to be incidental to collection and use of the stems, possibly in matting. Poaceae Type X seeds are possibly in the Festucaceae tribe based on morphological traits including basal embryo, slender profile, and the presence of a short stalk or rachilla. They occurred only in a Feature 1 sample which also contained concentrations of grass stems, some of which may be *Phragmites communis*. While *Phragmites* is within the Festucaceae tribe, it rarely produces seed, according to Gleason and Cronquist (1991).

Table 3. Summary of Identified Seeds.

Seed Type	Number	Percentage
Unknown Poaceae Type X	26	32.10%
Phaseolus vulgaris (common bean)	18	22.22%
Phytolacca americana (pokeweed)	12	14.81%
Helianthus annuus (common sunflower)	6	7.41%
Sambucus canadensis (elderberry)	5	6.17%
Fabaceae (bean family)	3	3.70%
Galium spp. (bedstraw/cleavers)	3	3.70%
Rhus spp. (sumac)	2	2.47%
Poaceae (grass family)	1	1.23%
Polygonum spp. (knotweed/smartweed)	1	1.23%
Cyperaceae (sedge family)	1	1.23%
Rubus spp. (blackberry/raspberry)	1	1.23%
Viburnum Sp. (viburnum)	1	1.23%
Vitis spp. (grape)	1	1.23%

The remaining seeds in the assemblage, pokeweed (*Phytolacca americana*), sedge family (Cyperaceae), bean family (Fabaceae), bedstraw/cleavers (*Galium* sp.), knotweed/smartweed (*Polygonum* sp.), and viburnum (*Viburnum* sp.) are interpreted as naturally occurring products of plants growing in the site vicinity. However, this interpretation is somewhat equivocal. For example, various parts of the pokeweed plant, including the toxic berries, were widely utilized by Native Americans as medicine (Moeller 1992:113; Moerman 1986:337-338), a use that cannot be ruled out for the plant at this prehistoric site.

Maize

Maize (*Zea mays*) totalled 249 fragments (2.84 g), consisting of cupules, kernels, glumes, and embryos. All maize was recovered from Features 1 and 2. Examination of relatively intact kernels and cupules suggests that they are typical of the Eastern Eight Row morphological type within the Northern Flint cultivar (King 1987:84). Kernels are approximately 1.5 times wider than tall, and cupules, although relatively small (8.00 mm or less in width), display angles of 90 degrees, consistent with dimensions of Eastern Eight Row cobs. By the time of the Late Woodland occupation at this site, maize cultivation was a major part of subsistence strategies in the Northeast.

Other Botanical Materials

Grass stems, totalling 168 fragments in the large fraction (>2 mm) were the most numerous item in this miscellaneous category. As suggested above, it is likely that at least some of the stems may be *Phragmites communis*, and that they were utilized on the site, possibly in the manufacture of matting. Two large tree buds were present in Feature 1, probably coincident with collection of wood for fuel. A small fragment of fungal material in Feature 2 of a type often seen in archaeobotanical collections may have been associated with the burning of decaying wood.

SUMMARY

The botanical assemblage from Features 1, 2, and 3 clearly demonstrates basic patterns of Late Woodland plant exploitation in the Northeast. Although most available wood types were utilized for fuel, those with the highest fuel value, oak and hickory, were favored. At least three plants; maize, beans and sunflower, were cultivated in gardens and fields. Wild plant foods, especially the nuts black walnut and hickory, were also harvested. Fleshy fruits and berries such as grape and elderberry may have contributed to diet by adding variety in taste and nutrition. All of the major plant resources represented, cultigens and nuts, as well as fruits in dried form, are storable resources, and would have been utilized throughout the year. Similar combinations of cultivated and wild resources, reflecting participation in a mixed economy, appear consistently in Late Woodland botanical collections from this region (Moeller 1992; Parker 1992). The individual components demonstrate considerable variability from one region to another and from site to site, suggesting a subsistence adaptation that was uniform only in its flexibility.

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APPENDIX 2

PLANT REMAINS FROM THE COMFORT STATION EXCAVATIONS

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May 1993

METHODS OF BOTANICAL ANALYSIS

Botanical remains recovered from the flotation of matrix samples from a large platform hearth located during previous monitoring during construction of the Dingmans Launch comfort station were identified and evaluated. Carbonized materials in each flotation sample were separated into two size fractions using a No. 10 geological sieve (2-mm mesh). Using a standard binocular microscope at low magnification (10x), all carbonized materials in each large fraction (>2 mm) were extracted and sorted into categories (e.g., wood, nutshell). Each category was subsequently weighed, and the number of items in each counted. An attempt was made to identify all nut and the first 20 randomly selected wood fragments (or all wood, if there were less than 20) in the large fraction.

In this analysis, wood charcoal fragments examined but found to be unidentifiable at least to family were grouped into one of three categories: diffuse porous hardwood, ring porous hardwood, or unidentifiable. Diffuse porous woods include tree taxa such as maple (*Acer* spp.), beech (*Fagus grandifolia*), and poplar (*Populus* spp.). Ring porous woods may be from any one of several taxa commonly occurring in the Delaware Water Gap area, including various oaks (*Quercus* spp.), hickories (*Carya* spp.), and ash (*Fraxinus* spp.). Fragments in which all distinctive morphological traits were distorted or destroyed during carbonization were classified as unidentifiable.

The small fraction (<2 mm) was examined carefully at 10-30x for seeds, cultigen remains, monocot stems, etc. Any observed were extracted, identified, and counted. Wood and nutshell counts and weights were based on materials in the large fraction only. Genus level identifications were made whenever possible. Species identifications were attempted only when morphological comparisons ruled out other members of a genus (i.e., *Corylus americana).*

Species identifications and scientific nomenclature follow Core et al. (1979), Gleason and Cronquist (1991), and Martin and Barkley (1961)

RESULTS OF ANALYSIS

Botanical remains from 19 flotation samples representing 75 liters of fill from Feature 1 were examined. Thirteen of the samples (68%) contained identifiable floral material, most of it wood charcoal (Table 1). Wood charcoal was the most abundant class of material, with a total of approximately 110,562 fragments, weighing 910.59 g. The identified wood assemblage (77 fragments) reflects exploitation of a narrow range of available tree types, with primary use of oak, especially from the red subgenus (*Quercus Erythrobalanus*). Hickory (*Carya* spp.) was the only non-oak wood type identified. It is likely that the majority of the 64 fragments classifiable only as ring porous are oak and hickory as well.

Nutshell, totaling 350 fragments (3.76 g), was present in 10 samples. Black walnut (*Juglans nigra*) was the most abundant type, but amorphous thick-shelled fragments identifiable only as hickory/walnut family (Juglandaceae) were more widely distributed. Other nut taxa less well-represented were hickory (*Carya* spp.), acorn (*Quercus* spp.), and hazelnut (*Corylus americana*). The co-occurrence of several nut types within Feature 1 suggests that all available nut resources were utilized.

Seeds numbered seven, of which three were identified; one each of huckleberry (*Gaylussacia* sp.), raspberry/blackberry (*Rubus* sp.), and knotweed (*Polygonum* sp.). Fleshy fruits such huckleberry, raspberry, and blackberry are known to have been a valued item among historic Native Americans (Yanovsky 1936; Yarnell 1964). The seeds are also frequently encountered in Late Archaic through Late Woodland archaeobotanical assemblages, suggesting an equivalent prehistoric dietary contribution. The knotweed seed is likely to represent a plant naturally occurring in the site vicinity. Although erect knotweed (*Polygonum erectum*) was widely cultivated prehistorically throughout mid-latitudes of the continental United States, the seed in Feature 1 is from a different species.

Table 1. Plant Remains Recovered From Flotation of Feature 1 at 36PI136 (Comfort Station Excavations).

Level Provenience	2	3	4	1	lense	1	2	3	4	5	6	7	8	9	10	8	10	10		TOTALS
Sample N.	50	51	52	52	54	67	68	69	70	72	73	74	75	76	77	302	309	310	354	
Sample Volume (l)	3.0	3.0	3.0	3.0	3.0	2.0	3.0	4.0	4.0	4.0	4.0	3.0	3.0	3.0	3.0	4.0	8.0	12.0	3.0	75.0
Total Wood (N)	14	33	2	6	9	11	5	3	2	2	14	2	1	9	38	390	30,000	80,000	21	110,562
Total Wood Wt. (g)	0.09	0.26	0.01	0.03	0.08	0.06	0.02	0.01	0.01	0.01	0.08	0.01	<.01	0.07	0.35	3.75	295.60	610.00	0.15	910.59
Breakdown by Taxon (N)																				
Carya spp. (hickory)											1					6	1	4		12
Quercus spp. (oak)														2	5	5	5	2		19
Q., subf. Erythrobalanus (red oak group)	2	4		1	1	2								1	5	4	8	13	5	46
Q., subf. Lepidobalanus (white oak group)																	1			1
diffuse porous					1															1
ring porous	5	5	1	3	2	3	3		2	1	6	2	1	5	9	5	5		6	64
unidentifiable	7	11	1	2	5	8	2	3		1	7			1	1			1	9	59
Total Nutshell (N)	27	216	0	0	59	1	0	2	2	0	9	0	0	22	9	3	0	0	0	350
Total Nutshell Wt. (g)	0.32	2.48			0.44	0.01		0.01	0.01		0.07			0.37	0.10	0.03				3.84
Breakdown by Taxon																				
Carya spp.	20	4																		24
(hickory)	0.27	0.09																		0.36
Corylus americana														1		3				4
(hazelnut)														0.01		0.03				0.04
Juglandaceae	5	10			40	1		2	2		7			2						69
(hickory/walnut family)	0.04	0.06			0.31	0.01		0.01	0.01		0.06			0.01						0.51
Juglans nigra		205			1									19	8					233
(black walnut)		2.33			0.03									0.35	0.1					2.81
Quercus spp.	2	1			18						2				1					24
(acorn)	0.01	<.01			0.10						0.01				<.01					0.12
Total Seeds (N)	0	0	0	0	0	0	0	1	1	3	1	0	0	0	1	0	0	0	0	7
Breakdown by Taxon																				
Gaylussacia sp. (huckleberry)										1										1
Polygonum sp. (smartweed)								1												1
Rubus sp. (raspberry/ blackberry)									1											1
unidentifiable										2	1				1					4

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APPENDIX 3

ARTIFACT CATALOG

DINGMANS LAUNCH LOWER BOAT RAMP (36Pi136)

ANCS #	OBJECT NAME/DESCRIPTION	MATERIAL	COUNT	MEASUREMENTS
** FEATURE 1, NORTH HALF				
60684	NETSINKER, TRIMMED RECTANGULAR TYPE	METASEDIMENTARY ROCK	1	WT:41.7g; L:6.21cm; W:5.12cm; T:0.9cm
60685	ROCK, CRACKED	PROBLEMATIC ROCK	1	WT:41.3g
60686	FLAKE, DECORTICATION	METASEDIMENTARY ROCK	2	WT:7.9g
60687	FLAKE, EARLY REDUCTION	QUARTZITE	1	WT:12.6g
60688	CELT, GROUND/POLISHED, FIRE-CRACKED; MENDED FROM 4 PIECES	METASEDIMENTARY ROCK	1	WT:133.0g; L:10.61cm; W:4.01cm; T:2.76cm
60689	PESTLE, PECKED	METASEDIMENTARY ROCK	1	WT:1,147.5g; L:24.2cm; W:7.5cm; T:4.6cm
60690	POTTERY VESSEL BODY SHERD, POLISHED	SAND-TEMPERED CERAMIC	1	WT:3.2g
60691	POTTERY VESSEL NECK FRAGMENT, POLISHED	SAND-TEMPERED CERAMIC	1	WT:0.5g
60692	POTTERY VESSEL SHOULDER FRAGMENT, POLISHED WITH SHALLOW, INCISED RIGHT-DIAGONAL LINES	SAND-TEMPERED CERAMIC	1	WT:3.0g
60693	DAUB FRAGMENT, WITH ROCK INCLUSIONS	BAKED/BURNT SOIL	6	WT:12.1g
60694	POTTERY VESSEL BODY SHERD	GRIT-TEMPERED CERAMIC	1	WT:2.5 g
60696	POTTERY VESSEL BODY SHERD, POLISHED	SAND-TEMPERED CERAMIC	6	WT:12.8g
60697	POTTERY VESSEL BODY SHERD, POLISHED	SAND-TEMPERED CERAMIC	1	WT:30.6g
60698	POTTERY VESSEL BODY SHERD, POLISHED	SAND-TEMPERED CERAMIC	1	WT:13.2g
60699	BURNT CLAY FRAGMENT	BAKED/BURNT SOIL	1	WT:1.1g
60700	POTTERY VESSEL BODY SHERD, POLISHED	SAND-TEMPERED CERAMIC	1	WT:14.3g
60701	POTTERY VESSEL BODY SHERD, POLISHED	SAND-TEMPERED CERAMIC	1	WT:1.6g
60702	POTTERY VESSEL SHOULDER FRAGMENT, POLISHED WITH SHALLOW, INCISED, RIGHT-DIAGONAL LINES	SAND-TEMPERED CERAMIC	1	WT:14.2g
60703	TOBACCO PIPE STEM FRAGMENT	GRIT-TEMPERED CERAMIC	1	WT:1.2g
60704	POTTERY VESSEL BODY SHERD, POLISHED	SAND-TEMPERED CERAMIC	1	WT:7.3g
60705	TESHOA, COBBLE CORTEX	METASEDIMENTARY ROCK	1	WT:24.4g
** Subtotal **			35	
** FLOTATION - FEATURE 1, NORTH HALF				
60695	BEANS, BURNT	VEGETAL	7	
60840	CORE, BIPOLAR, UNIFACIAL RETOUCH	JASPER	1	WT:0.9g
60841	ROCK, CRACKED	PROBLEMATIC ROCK	15	WT:153.8g
60842	FLAKE, BIFACE REDUCTION	CHERT	1	WT:0.1g
60843	FLAKE, BIFACE REDUCTION	JASPER	2	WT:0.1g
60844	SHATTER, BLOCKY	JASPER	2	WT:0.2g
60845	FLAKE FRAGMENT	CHERT	3	WT:0.3g
60846	FLAKE FRAGMENT	JASPER	5	WT:0.2g
60847	BURNT CLAY FRAGMENT	BAKED/BURNT SOIL	1	WT:0.5g
60848	POTTERY VESSEL BODY SHERD, PLAIN	CERAMIC	27	WT:7.4g; T:~5mm
60814	LONGBONE FRAGMENT (BIRD OR SMALL MAMMAL)	BONE	1	
60815	MANDIBLE FRAGMENTS, WHITE-TAIL DEER	BONE	3	
60816	MOLAR FRAGMENTS, WHITE-TAIL DEER	BONE	4	
60817	BONE FRAGMENTS, UNIDENTIFIED MAMMAL	BONE	134	
60818	LONGBONE FRAGMENTS, MEDIUM MAMMAL	BONE	9	
60901	SAMPLE, BOTANICAL	VEGETAL	1	
** Subtotal **			216	
** FEATURE 1, SOUTH HALF				
60706	CHOPPER/ANVIL	METASEDIMENTARY ROCK	1	WT:349.0g; L:10.48cm; W:7.97cm; T:3.08cm
60707	ROCK, CRACKED	PROBLEMATIC ROCK	2	WT:842.4g
60708	FLAKE, EARLY REDUCTION	METASEDIMENTARY ROCK	2	WT:4.8g
60709	POTTERY VESSEL BODY SHERD, POLISHED (4 mend)	SAND-TEMPERED CERAMIC	8	WT:21.4g
60710	POTTERY VESSEL BODY SHERD, POLISHED	SAND-TEMPERED CERAMIC	1	WT:1.1g
60711	POTTERY VESSEL RIM SHERD; SMOOTHED FLAT LIP WITH CASTELLATION; TWO SHALLOW BROAD INCISED LINES BELOW LIP	GRIT-TEMPERED CERAMIC	1	WT:2.7g
60712	POTTERY VESSEL BODY SHERD, POLISHED	SAND-TEMPERED CERAMIC	1	WT:1.1g
** Subtotal **			16	

W - Weight; L - Length; W - Width; T - Thickness

DINGMANS LAUNCH LOWER BOAT RAMP (36Pi136)

ANCS #	OBJECT NAME/DESCRIPTION	MATERIAL	COUNT	MEASUREMENTS
** FLOTATION - FEATURE 1, SOUTH HALF				
60819	UNIDENTIFIED BONE FRAGMENTS	BONE	43	
60820	BONE FRAGMENTS, MEDIUM MAMMAL	BONE	3	
60849	CORE, BIPOLAR	JASPER	1	WT:0.4g
60850	ROCK, CRACKED	PROBLEMATIC ROCK	2	WT:2.3g
60851	FLAKE, BIFACE REDUCTION	CHERT	1	WT:0.1g
60852	SHATTER, FLAKE	CHERT	1	WT:0.1g
60853	POTTERY VESSEL BODY SHERD, PLAIN	CERAMIC	34	WT:26.8g; T:~4.5mm
60902	SAMPLE, BOTANICAL	VEGETAL	1	
** Subtotal **			86	
** FEATURE 1, ASSOCIATED MATRIX				
60713	ROCK, CRACKED	PROBLEMATIC ROCK	13	WT:4,536.0g
60714	POTTERY VESSEL BODY SHERD, POLISHED; 4 MEND; 3 PIECES HAV IRREGULAR INCISIONS	SAND-TEMPERED CERAMIC	9	WT:36.3g
** Subtotal **			22	
** FEATURE 1, GENERAL PROVENIENCE				
60715	METATE, MINOR ANVIL USE	METASEDIMENTARY ROCK	1	WT:1,084.4g
60716	ROCK, CRACKED	PROBLEMATIC ROCK	9	WT:2,398.2g
60717	SHATTER, BLOCKY, COBBLE CORTEX	CHERT	1	WT:4.6g
60718	POTTERY VESSEL BODY SHERD, POLISHED	SAND-TEMPERED CERAMIC	3	WT: 2.6g
60719	TESHOA, COBBBLE CORTEX	METASEDIMENTARY ROCK	1	WT:26.4g
** Subtotal **			15	
** FLOTATION - FEATURE 1, GENERAL PROVENIENCE				
60821	UNIDENTIFIED BONE FRAGMENT	BONE	8	
60854	ROCK, CRACKED	PROBLEMATIC ROCK	9	WT:3.8g
60855	POTTERY VESSEL BODY SHERD, PLAIN	SAND-TEMPERED CERAMIC	4	WT: 0.7g; T:~3mm
60903	SAMPLE, BOTANICAL	VEGETAL	1	
** Subtotal **			22	
** FEATURE 2, GENERAL PROVENIENCE				
60720	FLAKE, EARLY REDUCTION	QUARTZITE	1	WT:0.1g
** Subtotal **			1	
** FLOTATION - FEATURE 2, GENERAL PROVENIENCE				
60822	UNIDENTIFIED BONE FRAGMENTS	BONE	199	
60823	CARPAL/TARSEL FRAGMENTS, MEDIUM MAMMAL	BONE	2	
60824	LONGBONE FRAGMENTS, MEDIUM MAMMAL	BONE	3	
60825	VERTEBRA, SMALL FISH	BONE	1	
60856	BIFACE FRAGMENT	JASPER	1	WT:0.1g
60857	CORE, BIPOLAR	JASPER	1	WT:0.2g
60858	ROCK, CRACKED	PROBLEMATIC ROCK	12	WT:38.4g
60859	FLAKE FRAGMENT	CHERT	1	WT:0.1g
60860	FLAKE FRAGMENT	JASPER	5	WT:0.4g
60861	BURNT CLAY FRAGMENT	BAKED/BURNT SOIL	20	WT:0.4g
60862	POTTERY VESSEL BODY SHERD, PLAIN, SPALLED	CERAMIC	10	WT:2.0g; T:~4mm
60863	BEAD FRAGMENT, HAND-MOLDED, INCISED	CERAMIC	1	Exterior Diam:13mm; Bore Diam:1.5mm
60864	POTTERY VESSEL BODY SHERD, PLAIN, ERODED	CERAMIC	3	WT:0.6g
60904	SAMPLE, BOTANICAL	VEGETAL	1	
** Subtotal **			260	

DINGMANS LAUNCH LOWER BOAT RAMP (36Pi136)

ANCS #	OBJECT NAME/DESCRIPTION	MATERIAL	COUNT	MEASUREMENTS
** FEATURE 2, SOUTH HALF				
60721	POTTERY VESSEL BODY SHERD	GRIT-TEMPERED CERAMIC	2	WT:3.6g
60722	POTTERY VESSEL COLLAR SHERD WITH MULTIPLE, PERPENDICULAR INCISED LINES	GRIT-TEMPERED CERAMIC	1	WT:6.5g
** Subtotal **			3	
** FLOTATION - FEATURE 2, SOUTH HALF				
60826	UNIDENTIFIED BONE, POSSIBLE TURTLE	BONE	4	
60827	UNIDENTIFIED BONE FRAGMENTS	BONE	196	
60828	LONGBONE FRAGMENT, POSSIBLY BIRD	BONE	1	
60829	LONGBONE FRAGMENT, MAMMAL	BONE	16	
60830	PHALANGE, PROXIMAL FRAG., MEDIUM MAMMAL	BONE	1	
60865	ROCK, CRACKED	PROBLEMATIC ROCK	13	WT:22.9g
60866	FLAKE, BIFACE REDUCTION	CHERT	6	WT:0.6g
60867	SHATTER, BLOCKY	CHERT	1	WT:0.1g
60868	FLAKE FRAGMENT	CHERT	7	WT:0.1g
60869	FLAKE FRAGMENT	JASPER	1	WT:0.1g
60870	POTTERY VESSEL BODY SHERD, PLAIN	GRIT-TEMPERED CERAMIC	1	WT:0.3g; T:4.7mm
60871	BEAD FRAGMENT, HAND-MOLDED, INCISED	CERAMIC	1	
60905	SAMPLE, BOTANICAL	VEGETAL	1	
** Subtotal **			249	
** FEATURE 2, NORTH HALF				
60723	FLAKE, EARLY REDUCTION	METASEDIMENTARY ROCK	1	WT:3.8g
60724	POTTERY VESSEL BODY SHERD	GRIT-TEMPERED CERAMIC	1	WT:2.0g
60725	POTTERY VESSEL RIM SHERD; FLAT, STRAIGHT LIP WITH DEEP, RIGHT-DIAGONAL INCISED LINES	GRIT-TEMPERED CERAMIC	1	WT:2.0g
60726	POTTERY VESSEL BODY SHERD	GRIT-TEMPERED CERAMIC	1	WT:2.6g
60727	TESHOA, COBBLE CORTEX	METASEDIMENTARY ROCK	1	WT:43.6g
** Subtotal **			5	
** FLOTATION - FEATURE 2, NORTH HALF				
60831	UNIDENTIFIED BONE FRAGMENTS	BONE	82	
60832	PROXIMAL METAPODIAL FRAG., SMALL MAMMAL	BONE	1	
60833	LONGBONE FRAG., MEDIUM MAMMAL	BONE	2	
60834	UNIDENTIFIED BONE FRAG., MEDIUM MAMMAL	BONE	7	
60872	POTTERY VESSEL FRAGMENT	CERAMIC	4	WT:0.5g
60906	SAMPLE, BOTANICAL	VEGETAL	1	
** Subtotal **			97	
** FEATURE 3, NORTH HALF				
60728	PROJECTILE POINT, MIDSECTION	CHERT	2	WT:1.7g
60729	HAMMERSTONE/MANO, MINOR USE-WEAR	METASEDIMENTARY ROCK	1	WT:412.5g
60730	ROCK, CRACKED	PROBLEMATIC ROCK	49	WT:10,886.2g
60731	ATLATL WEIGHT FRAGMENT, GROUND/POLISHED AND DRILLED	BANDED SLATE	1	WT:46.6g
** Subtotal **			53	

DINGMANS LAUNCH LOWER BOAT RAMP (36Pi136)

ANCS #	OBJECT NAME/DESCRIPTION	MATERIAL	COUNT	MEASUREMENTS
** FLOTATION - FEATURE 3, NORTH HALF				
60835	UNIDENTIFIED BONE FRAGMENT	BONE	1	
60873	BIFACE FRAGMENT	CHERT	1	WT:0.1g
60874	ROCK, CRACKED	PROBLEMATIC ROCK	18	WT:44.4g
60875	FLAKE, BIFACE REDUCTION	CHERT	7	WT:0.2g
60876	FLAKE, BIFACE REDUCTION	JASPER	1	WT:0.2g
60877	SHATTER, BLOCKY	CHERT	1	WT:0.2g
60878	SHATTER, BLOCKY	QUARTZ	1	WT:0.1g
60879	FLAKE, EARLY REDUCTION	CHERT	1	WT:0.1g
60880	FLAKE, EARLY REDUCTION	JASPER	1	WT:0.8g
60881	FLAKE FRAGMENT	CHERT	6	WT:0.1g
60907	SAMPLE, BOTANICAL	VEGETAL	1	
** Subtotal **			39	
** FEATURE 3, SOUTH HALF				
60732	ANVILSTONE	METASEDIMENTARY ROCK	1	WT:1,234.7g
60733	ROCK, CRACKED	PROBLEMATIC ROCK	51	WT:5,443.2g
60734	FLAKE, BIFACE REDUCTION	CHERT	1	WT:0.1g
60735	FLAKE, EARLY REDUCTION	METASEDIMENTARY ROCK	1	WT:11.4g
60736	FLAKE FRAGMENT	CHERT	1	WT:0.4g
** Subtotal **			55	
** FLOTATION - FEATURE 3, SOUTH HALF				
60882	ROCK, CRACKED	PROBLEMATIC ROCK	42	WT:123.9g
60883	FLAKE, BIFACE REDUCTION	CHERT	1	WT:0.2g
60884	FLAKE FRAGMENT	CHERT	6	WT:0.2g
60836	UNIDENTIFIED BONE FRAGMENT	BONE	9	
60837	LONGBONE FRAGMENT, MEDIUM MAMMAL	BONE	4	
60838	SAMPLE, CLAM SHELL, SMALL VALVE	SHELL	1	
60908	SAMPLE, BOTANICAL	VEGETAL	1	
** Subtotal **			64	
** FEATURE 4, NORTH HALF				
60737	ROCK, CRACKED	PROBLEMATIC ROCK	96	WT:97,631.0g
** Subtotal **			96	
** FLOTATION - FEATURE 4, NORTH HALF				
60885	ROCK, FIRE-CRACKED	PROBLEMATIC ROCK	572	WT:10,457.5g
60909	SAMPLE, BOTANICAL	VEGETAL	1	
** Subtotal **			573	
** FLOTATION - FEATURE 4, SOUTH HALF				
60839	UNIDENTIFIED BONE FRAGMENTS	BONE	4	
60886	ROCK, CRACKED	PROBLEMATIC ROCK	130	WT:8,205.0g
60887	FLAKE, EARLY REDUCTION WITH BLOCK CORTEX	JASPER	1	WT:0.2g
60910	SAMPLE, BOTANICAL	VEGETAL	1	
** Subtotal **			136	
** FEATURE 7, BETWEEN RAMPS				
60739	ROCK, CRACKED	PROBLEMATIC ROCK	7	WT:881.9g
** Subtotal **			7	

ANCS #	OBJECT NAME/DESCRIPTION	MATERIAL	COUNT	MEASUREMENTS
** FEATURE 8				
60742	CHOPPER FRAGMENT WITH BLOCK CORTEX (CRUDELY FLAKED SLAB)	SHALE	1	WT:339.1g
60743	PROJECTILE POINT, FOX CREEK	ARGILLITE	1	WT:7.4g; L:4.21cm; W:2.46cm; T:0.69cm
60744	ROCK, CRACKED	PROBLEMATIC ROCK	6	WT:1,148.8g
** Subtotal **			8	
** FEATURE 9, SURFACE COLLECTION				
60747	BIFACE FRAGMENT, MIDDLE STAGE	CHERT	1	WT:20.1g
60748	ROCK, CRACKED	PROBLEMATIC ROCK	5	WT:178.3g
60749	FLAKE, BIFACE REDUCTION	CHERT	41	WT:29.3g
60750	FLAKE, BIFACE REDUCTION	RHYOLITE	1	WT:0.1g
60751	FLAKE, EARLY REDUCTION	CHERT	31	WT:12.8g
60752	FLAKE, EARLY REDUCTION	METASEDIMENTARY ROCK	2	WT:1.7g
60753	FLAKE, EARLY REDUCTION, COBBLE CORTEX	METASEDIMENTARY ROCK	1	WT:1.0g
60754	FLAKE FRAGMENT	CHERT	83	WT:33.5g
60755	FLAKE FRAGMENT, COBBLE CORTEX	CHERT	1	WT:0.4g
60756	SHATTER, FLAKE	METASEDIMENTARY ROCK	2	WT:1.3g
60757	SHATTER, FLAKE, COBBLE CORTEX	METASEDIMENTARY ROCK	2	WT:2.8g
60758	STONE VESSEL BODY SHERD, PECKED AND GROUND, FIRE-REDDENED	SOAPSTONE (STEATITE)	4	WT:12.5g
** Subtotal **			174	
** UNIT 1, STR.A, LEV.1, FEATURE 9				
60759	BIFACE FRAGMENT MENDS TO ANCS 60,747 (Recent Break)	CHERT	1	WT:8.5g
60760	PROJECTILE POINT, SUSQUEHANNA BROADSPEAR (TWO JOINED PIECES; OLD BREAK)	CHERT	1	WT:9.8g; W:2.94cm; T:0.64cm
60762	PROJECTILE POINT TIP FRAGMENT	CHERT	1	WT:0.4g
60763	ROCK, CRACKED	PROBLEMATIC ROCK	8	WT:324.7g
60764	FLAKE, BIFACE REDUCTION	CHERT	30	WT:9.3g
60765	FLAKE, BIFACE REDUCTION	METASEDIMENTARY ROCK	1	WT:2.4g
60766	FLAKE, EARLY REDUCTION	CHERT	14	WT:7.9g
60767	FLAKE, EARLY REDUCTION, COBBLE CORTEX	CHERT	1	WT:0.6g
60768	FLAKE, EARLY REDUCTION, BLOCK CORTEX	CHERT	2	WT:1.6g
60769	FLAKE FRAGMENTS	CHERT	56	WT:17.1g
60770	STONE VESSEL BODY SHERD, PECKED AND GROUND; EVIDENCE OF REPAIR HOLE, FIRE-REDDENED	SOAPSTONE (STEATITE)	1	WT:13.6g; T:0.11cm
60771	STONE VESSEL BODY SHERD, PECKED AND GROUND FIRE REDDENED; 1 FRAG. WITH CHARRED RESIDUE	SOAPSTONE (STEATITE)	5	WT:16.5g
** Subtotal **			122	
** FLOTATION - UNIT 1, STR.A, LEV.1, FEATURE 9				
60888	ROCK, CRACKED	PROBLEMATIC ROCK	6	WT:0.4g
60889	FLAKE, BIFACE REDUCTION	CHERT	4	WT:0.5g
60890	SHATTER, BLOCKY	CHERT	1	WT:0.1g
60891	FLAKE, EARLY REDUCTION	CHERT	2	WT:0.1g
60892	FLAKE FRAGMENT	CHERT	14	WT:0.3g
60893	SHATTER, FLAKE	CHERT	16	WT:0.1g
60911	SAMPLE, BOTANICAL	VEGETAL	1	
** Subtotal **			44	

DINGMANS LAUNCH LOWER BOAT RAMP (36Pi136)

ANCS #	OBJECT NAME/DESCRIPTION	MATERIAL	COUNT	MEASUREMENTS
** UNIT 1, STR.A, LEV.2, FEATURE 9				
60772	NETSINKER ? FRAGMENT	METASEDIMENTARY ROCK	1	WT:1.0g
60773	FLAKE, BIFACE REDUCTION	CHERT	9	WT:6.5g
60774	FLAKE, BIFACE REDUCTION	RHYOLITE	1	WT:0.1g
60775	FLAKE, EARLY REDUCTION	CHERT	7	WT:2.6g
60776	FLAKE FRAGMENT	CHERT	14	WT:4.3g
60777	STONE VESSEL BODY SHERD, PECKED AND GROUND	SOAPSTONE (STEATITE)	6	WT:5.9g
** Subtotal **			38	
** FLOTATION - UNIT 1, STR.A, LEV.2, FEATURE 9				
60894	FLAKE, BIFACE REDUCTION	CHERT	1	WT:0.1g
60895	SHATTER, FLAKE	CHERT	1	WT:0.1g
60912	SAMPLE, BOTANICAL	VEGETAL	1	
** Subtotal **			3	
** UNIT 1, STR.A, LEV.3, FEATURE 9				
60778	FLAKE, BIFACE REDUCTION	CHERT	3	WT:0.7g
60779	FLAKE, BIFACE REDUCTION	RHYOLITE	1	WT:0.1g
** Subtotal **			4	
** FLOTATION - UNIT 1, STR.A, LEV.3, FEATURE 9				
60896	FLAKE, BIFACE REDUCTION	CHERT	1	WT:0.1g
60897	SHATTER, BLOCKY	CHERT	1	WT:0.1g
60913	SAMPLE, BOTANICAL	VEGETAL	1	
** Subtotal **			3	
** UNIT 1, STR.A, LEV.4, FEATURE 9				
60780	ROCK, CRACKED	PROBLEMATIC ROCK	2	WT:136.2g
60781	FLAKE, BIFACE REDUCTION	ARGILLITE	4	WT:6.6g
60782	FLAKE, BIFACE REDUCTION	CHERT	2	WT:0.8g
60783	FLAKE, BIFACE REDUCTION	METASEDIMENTARY ROCK	1	WT:0.1g
60784	FLAKE FRAGMENT	ARGILLITE	3	WT:1.0g
60785	FLAKE FRAGMENT	CHERT	1	WT:0.4g
60786	FLAKE FRAGMENT	RHYOLITE	1	WT:0.1g
** Subtotal **			14	
** FLOTATION - UNIT 1, STR.A, LEV.4, FEATURE 9				
60898	SHATTER, BLOCKY	QUARTZ	1	WT:0.1g
60899	FLAKE FRAGMENT	CHERT	1	WT:0.1g
60900	SHATTER, FLAKE	CHERT	5	WT:0.1g
60914	SAMPLE, BOTANICAL	VEGETAL	1	
** Subtotal **			8	
** UNIT 1, STR.A, LEV.5				
60787	FLAKE, BIFACE REDUCTION	ARGILLITE	5	WT:1.4g
60788	FLAKE, EARLY REDUCTION	ARGILLITE	16	WT:9.7g
60789	FLAKE FRAGMENT	ARGILLITE	4	WT:4.2g
60791	FLAKE FRAGMENT	RHYOLITE	1	WT:0.1g
** Subtotal **			26	
** FLOTATION - UNIT 1, STR.A, LEV.5				
60915	SAMPLE, BOTANICAL	VEGETAL	1	
** Subtotal **			1	

DINGMANS LAUNCH LOWER BOAT RAMP (36Pi136)

ANCS #	OBJECT NAME/DESCRIPTION	MATERIAL	COUNT	MEASUREMENTS
** UNIT 1, STR.A, LEV.6				
60792	FLAKE, BIFACE REDUCTION	ARGILLITE	1	WT:0.4g
60793	FLAKE, EARLY REDUCTION	ARGILLITE	3	WT:2.4g
60794	FLAKE FRAGMENT	ARGILLITE	4	WT:3.4g
60796	FLAKE FRAGMENT	CHERT	1	WT:0.1g
** Subtotal **			9	
** FLOTATION - UNIT 1, STR.A, LEV.6				
60916	SAMPLE, BOTANICAL	VEGETAL	1	
** Subtotal **			1	
** FLOTATION - UNIT 1, STR.A, LEV.7				
60917	SAMPLE, BOTANICAL	VEGETAL	1	
** Subtotal **			1	
** UNIT 2, STR.A, LEV.1, FEATURE 9				
60797	ROCK, CRACKED	PROBLEMATIC ROCK	2	WT:97.3g
60798	FLAKE, BIFACE REDUCTION	CHERT	4	WT:1.6g
60799	FLAKE, EARLY REDUCTION	CHERT	14	WT:5.4g
60800	FLAKE, EARLY REDUCTION	METASEDIMENTARY ROCK	1	WT:2.1g
60801	FLAKE FRAGMENT	CHERT	20	WT:9.2g
60802	STONE VESSEL BODY SHERD, PECKED AND GROUND	SOAPSTONE (STEATITE)	1	WT:0.5g
** Subtotal **			42	
** FLOTATION - UNIT 2, STR.A, LEV.1, FEATURE 9				
60918	SAMPLE, BOTANICAL	VEGETAL	1	
** Subtotal **			1	
** UNIT 2, STR.A, LEV.2, FEATURE 9				
60803	FLAKE, EARLY REDUCTION	ARGILLITE	2	WT:0.4g
60804	FLAKE, EARLY REDUCTION	CHERT	1	WT:0.3g
60805	FLAKE FRAGMENT	ARGILLITE	2	WT:1.1g
60806	SHATTER, FLAKE	CHERT	1	
** Subtotal **			6	
** FLOTATION - UNIT 2, STR.A, LEV.2, FEATURE 9				
60795	SAMPLE, BOTANICAL	VEGETAL	1	
** Subtotal **			1	
** UNIT 2, STR.A, LEV.3, FEATURE 9				
60807	FLAKE, BIFACE REDUCTION	ARGILLITE	1	WT:0.6g
60808	FLAKE, BIFACE REDUCTION	JASPER	1	WT:0.1g
** Subtotal **			2	
** FLOTATION - UNIT 2, STR.A, LEV.3, FEATURE 9				
60761	SAMPLE, BOTANICAL	VEGETAL	1	
** Subtotal **			1	
** UNIT 2, STR.A, LEV.4				
60809	FLAKE, EARLY REDUCTION	ARGILLITE	1	WT:0.3g
** Subtotal **			1	

DINGMANS LAUNCH LOWER BOAT RAMP (36Pi136)

ANCS #	OBJECT NAME/DESCRIPTION	MATERIAL	COUNT	MEASUREMENTS
** FLOTATION - UNIT 2, STR.A, LEV.4				
60790	SAMPLE, BOTANICAL	VEGETAL	1	
** Subtotal **			1	
** UNIT 2, STR.A, LEV.5				
60810	ROCK, CRACKED	PROBLEMATIC ROCK	2	WT:1.7g
60811	FLAKE FRAGMENT	METASEDIMENTARY ROCK	1	WT:0.5g
** Subtotal **			3	
** FLOTATION - UNIT 2, STR.A, LEV.5				
60740	SAMPLE, BOTANICAL	VEGETAL	1	
** Subtotal **			1	
** FLOTATION - UNIT 2, STR.A, LEV.6				
60741	SAMPLE, BOTANICAL	VEGETAL	1	
** Subtotal **			1	
** UNIT 2, STR.A, LEV.7				
60812	FLAKE, BIFACE REDUCTION	CHERT	1	WT:0.1g
** Subtotal **			1	
** FLOTATION - UNIT 2, STR.A, LEV.7				
60745	SAMPLE, BOTANICAL	VEGETAL	1	
** Subtotal **			1	
** FLOTATION - UNIT 2, STR.A, LEV.8				
60746	SAMPLE, BOTANICAL	VEGETAL	1	
** Subtotal **			1	
** GENERAL PROVENIENCE				
60738	MANO	METASEDIMENTARY ROCK	1	WT:536.6g
** Subtotal **			1	
*** Total ***			2570	

U.S. Department of the Interior Mission Statement

As the Nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally-owned public lands and natural resources. This includes fostering sound use of our land and water resources; protecting our fish, wildlife, and biological diversity; preserving the environmental and cultural values of our national parks and historical places; and providing for the enjoyment of life through outdoor recreation. The Department assesses our energy and mineral resources and works to ensure that their development is in the best interests of all our people by encouraging stewardship and citizen participation in their care. The Department also has a major responsibility for American Indian reservation communities and for people who live in island territories under U.S. administration.

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